Gas Journal

JUNE 3, 1936

Vol. 214 88th Year No. 3811

Editorial Notes

The Coal Mines Bill

THE debate on the Second Reading of the Coal Mines Bill, to which we referred briefly when discussing the situation a fortnight ago, indicated the opposition which members of all parties feel to the whole principle embodied in the Bill.

We have already made clear our view that there could be little justification for the hasty manner in which this ill-considered measure was presented to Parliament, and the Government did not improve the prospects of their Bill by bringing forward vital amendments, the exact effect of which no Member of the House of Commons had had an opportunity to discover. Had the Bill not been withdrawn there is a distinct probability that the Government would have been defeated. The future of the Bill, after this abortive effort to launch it, was uncertain until Thursday of last week, when Mr. Baldwin, in answer to a question in the House, stated that, while the Government held by the principles of the Bill which form an integral part of the measures designed to improve the condition of the coal industry, they have decided that it must be postponed until the Autumn. While lack of parliamentary time was stated by the Prime Minister to be the reason for the delay, he said that the Government will make use of the interval to redraft the Bill, and will ask the House to proceed with the new Bill after the Summer Recess.

It must not be assumed that the withdrawal of the Bill indicates that the danger that old King Coal may become Dictator Coal is past. Such, unfortunately, is far from being the case. It must be appreciated that the Bill dealt primarily with the question of the amalgamation of Coal Mines, and that all the political partizanship which brought opposition from all quarters, if for different reasons, to give the Government such an uncomfortable time, was directed against the provisions of this part of the Bill. Although on Second Reading Sir Reginald Clarry, M.P., and Mr. W. Ross Taylor, M.P., with their accustomed skill, found an opportunity to place the case of the consumer before the House, the only part of this Bill by which the consumer is directly affected is Section 9, which extends the operations of various Coal Boards for a further period of five years.

The real danger, of course, lies in the orders which are made under Part 1 of the 1930 Act, and it is by these orders that the Board of Trade hope to confer the monopolistic powers to which, in the absence of due safeguards, the Gas Industry so justly objects. It was by means of such an order that centralized buying and selling was authorized in the Lancashire and Cheshire District. The Lancashire and Cheshire experiment is now to be extended to the whole country, and orders for this purpose are already in draft and have been laid before Parliament. Legislation by order, even in cases where orders have to be laid before Parliament, too often means government by civil servants. Whereas a Bill does not become law unless it has been considered by both Houses, orders constantly slip through Parliament without being noticed.

This simply must not be allowed to become the case with regard to coal upon which not only our Industry but the whole of the industrial life of our country depends. Every gas undertaker must, both in season and out, impress upon the Members of Parliament for its area the all-important fact that the consumer has no adequate protection against the unprecedented and monopolistic powers which the orders propose to confer upon the coal industry.

The Meeting of Protest

THE meeting convened to protest against the coal policy of the Government, which is reported elsewhere in this issue, was a fine demonstration of the unity of the Gas Industry. In our Industry there is no division between the company and the municipally owned undertaking, and all sides of the Industry are anxious to contribute their particular quota to the common weal. In the matter of coal the assistance which can be rendered by local authority departments, whether gas, electricity, or water, is invaluable; and it is to be hoped that every gas committee will make certain that the true nature of the coal proposals of the Government are appreciated by their Councils. There could be nothing more certain to affect the attitude of the Government than a large number of resolutions passed by Local Authorities demanding that in any re-organization of the coal industry fair play shall be given to the consumer.

The points at issue were clearly and simply expressed, in the excellent speech made by Sir David Milne-Watson, at the Protest Meeting, and we make no apology for summarizing them here. They are as follows:

1. That there should be an obligation to supply the quantity and quality of coal required.
2. That there should be no unfair discrimination between the various classes of consumers.
3. That there should be an impartial and judicial tribunal to determine differences.

With regard to points (1) and (2), public utilities are ask-

ing no more than that obligations should be placed upon the coal industry similar to those which have long applied to gas, electricity, and water suppliers. With regard to (3) it is interesting to note that one of the most urgent requirements of the coal owners in their protest against the Bill was that there should be constituted an impartial tribunal to which they could appeal against any attempt to enforce amalgamations upon them. This tribunal was conceded by the Government on the Second Reading Debate. How is it then, as Sir David has asked, that the coal owners can refuse to agree to the same principle of an impartial tribunal to safeguard the interests of the consumer. Surely it is a case of what is sauce for the goose being sauce for the gander.

The B.G.F.

RETURNING for a moment to the more domestic aspect of the Protest Meeting, we feel that the Industry may well congratulate itself. There have been sceptics who have not failed to ask, in season and out, what useful purpose the British Gas Federation would be likely to serve, and when the occasion would be likely to arise for it to speak " with one voice " for the whole Gas Industry. The rally last week to the battle cry of Sir David Milne-Watson was most decidedly impressive, and its strength astonished even those who had not been among the sceptics. The meeting was indeed a vindication of the ideas of those who felt that a unifying organization was needed to embody the power and enhance the prestige of our Industry.

Those of us who read *The Times*, and perhaps customarily admire the fairness with which it looks at all points of view on any subject, have for some time now been dismayed at its apparent lack of consideration for the consumers' interests in all its discussions upon the coal mining situation. It was a great pleasure to find that its first Leader on April 29, dealing with the coal situation, adopted quite a different tone from that to which we have unfortunately become accustomed. We particularly welcome its acknowledgment that " no exception can be taken to the requirement of the British Gas Federation that the re-organized coal industry should be under obligation to supply coal of a quality reasonably required by the consumer, and that impartial and independent tribunals should hear complaints."

The voice of the British Gas Federation, speaking for a united Gas Industry, has been heard in at least one influential quarter. And the Federation is only young.

Personal

The staff and employees of the Trowbridge Station, of British Gas Light Company, met at the Gas-Works at Trowbridge on April 28, officially to bid farewell to Mr. and Mrs. E. A. SAINSBURY, on Mr. Sainsbury's retirement from the position of Engineer and Manager of the Station after 16 years in that capacity.

A gift of a pair of binoculars and a camera, Mr. Sainsbury's own choice, was presented by Mr. B. F. Harris (Chief Clerk), who recalled that he joined the Gas Company as a boy when Mr. Sainsbury was assistant to his father, who was in charge. He paid tribute to the skill and consideration which had marked the career of Mr. Sainsbury, whom they all wished good health and happiness in the coming years of his retirement.

Mr. V. Borrett, speaking on behalf of the Works staff, heartily endorsed Mr. Harris' remarks and acknowledged Mr. Sainsbury's consideration for everyone in the Company's service.

Mr. H. Atlee Hunt (Distribution Manager) then, on behalf of the administrative staff, handed to Mrs. Sainsbury a gift of books as a mark of esteem and good wishes for the future.

Replying, Mr. Sainsbury acknowledged the loyalty of his colleagues in all departments, and expressed his thanks for the kind gifts, and the consideration which enabled him to choose the form which the presentation should take.

Hearty cheers were given for Mr. and Mrs. Sainsbury, on the call of Mr. J. V. Knight, who is Mr. Sainsbury's successor as Engineer and Manager.

Mr. Sainsbury was also the recipient of a mahogany bureau from the Directors, which was presented to him privately.

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The Board of the United Kingdom Gas Corporation, Ltd., has appointed Mr. J. H. WILLIAMS, F.C.A., of Messrs. Ashworth, Mosley, & Co., Manchester, as Consultant Accountant to the Central Administration of the Corporation and its Subsidiary Companies. Mr. Williams has been associated professionally with a number of Regional Schemes connected with the Industry and is Secretary of the Lancashire Co-operative Tar Scheme.

* * *

We learn that Mr. W. A. DEARDEN, Engineer and Manager of the Lancaster Corporation Gas Department, has been elected President of the Lancaster Rotary Club for the next Rotary year, which commences in July.

Forthcoming Engagements

June.

6.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Summer Visit to Southend-on-Sea.
8.—I.G.E.—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.
9.—I.G.E.—Council Meeting, 10 a.m.
10.—ASSOCIATION OF STATUTORY INSPECTORS OF GAS METERS.—17th Annual General Meeting, County Hall, Westminster, 10.15 a.m.
16.—I.G.E.—Gas Education Executive Committee, 2.30 p.m.
18.—I.G.E.—Refractory Materials Joint Committee (Stoke-on-Trent), 2.30 p.m.
19.—NORTH OF ENGLAND G.M.A. [AUXILIARY SECTION].—Meeting at South Shields and Paper by Mr. J. R. Porter.
19.—WAVERLEY ASSOCIATION OF GAS MANAGERS.—Annual Meeting at Edinburgh.
23.—I.G.E.—Gas Education Consultative Committee, 2.30 p.m.
24.—I.G.E.—Board of Examiners (Oral Examinations), 9.30 a.m.
30.—SOUTHERN ASSOCIATION.—Annual Summer Meeting.

July.

2.—I.G.E.—Joint Research Committee at 2.30 p.m.
3.—MANCHESTER DISTRICT ASSOCIATION.—Manchester Meeting.
8-10.—CANADIAN GAS ASSOCIATION AND NORTH-WEST CONFERENCE PACIFIC COAST GAS ASSOCIATION.—29th Annual Convention, Vancouver.
24.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—County Meeting at Swindon.

Sept.

10.—NORTH BRITISH ASSOCIATION.—Annual Meeting at Kirkintilloch.

(There will be no meeting of the Central Executive Board of the National Gas Council during the month of June.)

1936 "JOURNAL" DIRECTORY

Page 62. SKIPTON. L. B. Chapman appointed E. & M.
Page 82. DUNS. A. C. Finnie appointed M. vice F. Welsh, retired.

THE INSTITUTION OF GAS ENGINEERS' ANNUAL MEETING

May 26 to 29, 1936

THE PRESIDENT.

Colonel W. MONCRIEFF CARR, O.B.E., T.D., of Stretford, whose unavoidable absence through indisposition was much regretted.

A Review of the Proceedings

The business sessions were held in the Great Hall of the Institution of Civil Engineers in Great George Street, S.W. 1—Mr. STEPHEN LACEY (Senior Vice-President) presiding in the unavoidable absence of the President. Below we begin our Review of the Proceedings, while a full report of the discussions on the various Papers, together with a record of other business, social functions, and visits, will be found on subsequent pages of this issue of the "JOURNAL."

It must have been a sad blow to Colonel W. M. Carr to be prevented by illness from presiding at the Annual General Meeting of The Institution of Gas Engineers, held at the Institution of Civil Engineers in London last week. In Colonel Carr's unfortunate absence, Mr. Stephen Lacey, Senior Vice-President, took the chair, and at the outset, on his proposition, a telegram was dispatched to Colonel Carr expressing the great regret of the members of the Institution at his absence and sending cordial wishes for a speedy recovery to good health. A few moments after the telegram had been forwarded, a message was received from Colonel Carr stating that he was making good progress towards full recovery of health, and containing his good wishes for the success of the meeting.

Before proceeding with the business of the meeting, Mr. Lacey extended to members and visitors a hearty welcome, and in doing so Mr. Lacey mentioned especially the presence of Alderman Wilfred Wardle, Chairman of the Stretford and District Gas Board, and his colleagues. A special welcome was also extended to representatives of overseas Gas Associations and to those from abroad. The overseas visitors were: Mr. Tetsugi Aoki, Engineer to the South Manchuria Gas Company, Ltd.; Mr. Alport Barker, Deputy Mayor of Suva, accompanying a member of the Gas Industry; Mr. A. F. P. Hayman, Past-President of the Belgian Gas Association; Mr. Albert E. Hutchison, Controller of Gas Sales to the Australian Gas Light Company; Mr. John Irminger, President of the Norwegian Gasworks Association; Mr. E. Byam Wight, Chemical Engineer on the staff of the Metropolitan Gas Company of Melbourne; and Mr. M. Fukunaga, Engineering Assistant, South Manchuria Gas Company, Ltd.

Then came the announcement of the messages of greeting from M. A. Baril, President of the International Gas Union; M. Lachomette, President of the French Gas Association; M. P. Mougin, General Secretary of the International Gas Union; Herr Fritz Escher, Honorary President of the International Gas Union; the Danish Gasworks Association; Herr F. Zur Nedden, General Manager of the German Association of Gas and Water Engineers; the American Gas Association; and the President, M. Eduard Vessei, of the Hungarian Gasworks Association.

The Chairman then moved that the Annual Report for 1935-36 be taken as read, a motion which met with acceptance on the seconding by Mr. C. S. Shapley. An interesting feature of the Report is that the number of members of the Institution at the end of December last showed an increase of 60 over the figures for 1934. The membership figure stood at that date at 1,585. Next came the appointment of Mr. W. M. Galleway and Mr. A. L. Jennings as scrutineers of the ballots for the election of officers to various classes of membership of the Institution.

Presentation of Medals.

This brought us to the presentation of medals, on behalf of the President, by Mr. Lacey. The first award was the Institution Gold Medal to Mr. George Dixon for his Paper on "Problems and Answers in the Reconstruction of Manufacturing and Distributing Plant at Nottingham," read at the Institution Meeting last June. Expressing his thanks, Mr. Dixon acknowledged the help afforded to him by his staff and by the contractors responsible for the installation of the plant. The Paper, he emphasized, was the result of team work. The H. E. Jones London Medal was awarded to Mr. W. L. Boon for his Paper on "The Preparation, Marketing, and Utilization of Coke," presented at the same meeting; and the recipient of the Institution Silver Medal was Mr. T. P. Ridley for his Paper on "Gas Tariffs," read before the North of England Gas Managers' Association. The final award, the Institution Bronze Medal, was to Mr. W. Hodkinson, of Stretford, for his Paper on "Benzole Recovery and the Production of Motor Benzole," read at the meeting of the Manchester and District Junior Gas Association.

Retirement of Mr. W. E. Price.

The next item on the programme was the presentation to Mr. W. E. Price to mark the occasion of his retirement from the Honorary Secretaryship of the Institution, an

office which he held with universal approbation for 23 years. It was, said Mr. Lacey, thoroughly in keeping with the unselfish attitude of mind of Mr. Price that he should ask that the presentation from the members on his retirement should take the form of a special donation to the Benevolent Fund, and he was glad to say that the donation to the Fund already amounted to £360. At the same time they could not allow Mr. Price to retire without any tangible evidence of their gratitude, respect, and affection, and he asked Mr. Price to accept a silver tray bearing the following inscription:

> "Presented as a token of affection to William Edward Price by the members of The Institution of Gas Engineers, in grateful acknowledgment of the service rendered by him as Honorary Secretary of the Institution from 1913 to 1936."

Mr. Price, who, on rising to express his thanks, was greeted with prolonged applause, recorded that he had seen 22 Presidents through the Chair, and was glad to say that 17 of them were still living. He wished Mr. John Terrace, who is to succeed him in the office, all success, and wished the members *au revoir* but not *good-bye*.

An account of the career of Mr. Price, together with an appreciation, appears elsewhere in this issue of the "JOURNAL."

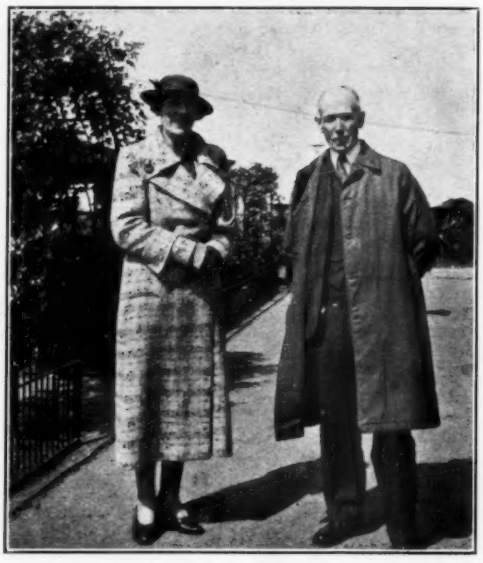
Presidential Address.

In the circumstances the Presidential Address of Colonel Carr was read by Mr. S. Lacey. In the opening part of Colonel Carr's Address there occurs the simple statement that the past year has been a record one in the history of the Stretford Gas Undertaking, the sales of gas showing an increase of no less than 24 per cent. Such an increase is not to be gained lightly in these days of fierce competition. It demands the application of modern methods of management, salesmanship, and service; it demands broad-minded, courageous policy, the taking of legitimate risks to secure new business. Colonel Carr emphasizes that the financial risk involved in adhering to flat rate methods of charge is greater than that involved in the introduction of attractive tariffs, and that the rapid development of industrial sales at Stretford dates, in the main, from the introduction of the two-part industrial tariffs eight years ago. An optional two-part tariff for all domestic consumers was introduced in 1934 and is being rapidly taken up. At the end of last March 20 per cent. of the total number of domestic consumers had adopted the tariff, and

The New President, with Mr. Alexander and Dr. Braunholtz.

it is interesting that, of these, prepayment users outnumbered ordinary consumers. Colonel Carr makes it clear, however, that the introduction of a tariff will not in itself produce additional business unless it is backed up by the best possible sales and service organization. This is equally true of both domestic and industrial supplies.

The successful manager of a gas undertaking to-day has to spend at least 80 per cent. of his time in the administration of his undertaking, more particularly that devoted to business development; and Colonel Carr gives his views on how capable administrators are to be obtained. In his opinion the technician is well equipped for management, but it does not follow that the ability of a gas engineer as such renders him suitable for commercial administration. On the other hand, the tendency of the Industry, he thinks, will be to continue to find its administrators from the ranks of technicians with the broadest theoretical and practical training who are well versed in business adminis-



Hon. Sec, Inst.Gas.E., with Miss K. M. Halpin, National Organizing Secretary of the W.G.C.

tration. Colonel Carr refers to the importance of the technical gas salesman, and urges the Institution to spare no effort to encourage the advancement of the gas engineer in this direction, in the belief that the profit on the modern gas undertaking is made in its service and sales organization.

Holding Companies.

What the aims of a holding company should be are outlined by Colonel Carr. It should provide for its subsidiaries the best commercial and technical brains to assist in the development of sales; it should help in the introduction of promotional tariffs, by the co-ordination of accountancy, by the provision of propaganda, service, and cheap finance for hire purchase, and so on. He also points to the advantage of being able to link up adjacent undertakings, which to-day is frequently prevented by reason of purely parochial interests. He believes that, in regard to central purchasing, a holding company should charge all materials and appliances to its subsidiaries at net cost, and for the purpose of financing its central administration make a charge upon its constituent companies based upon their output of gas. Thus, when the accounts of a subsidiary company are the subject of review the cost of the central administration can be seen in its relationship to services rendered. Moreover, it is desirable that a holding company should maintain the initiative and the interest of the manager of the subsidiary, who must at all times be held responsible for his own undertaking; he, on his part, should not lose sight of the necessity for the "team spirit."

As was to be expected, Colonel Carr discusses the coal situation, which is the source of so much anxiety to the Gas Industry at the moment—so important is its bearing on the progress of our Industry that an emergency meeting of the British Gas Federation was called, and was held on the Tuesday night at the Central Hall. A report of this meeting will be found on other pages of this issue. And among other matters touched upon by Colonel Carr are the need for increased expenditure on research and practical investigations in connection with the many problems at present before us, for greater support of the educational facilities offered by the University of Leeds, and for closer liaison not only with such bodies as the Association of Public Lighting Engineers, the Illuminating Engineering Society, the Institute of Fuel, and the Institution of Chemical Engineers, but with the Institutions of Civil and Mechanical Engineers, with whom increased interchange of communications is most desirable.

A vote of thanks to the President for his Address was

proposed by Mr. E. Crowther, of Salford. The Presidential Address, coming at the end of a year of office, he said, can be regarded hardly as an isolated piece of work but rather as the signature to the record of the year's work. The signature in this case was characteristic of the man. He saw three foundation-stones in the Address: First, a wholehearted belief in the Industry; secondly, a determination to urge it to take every means of developing its possibilities; and thirdly, a challenge to everything which might

THE NEW PRESIDENT.

STEPHEN LACEY, B.Sc., M.Inst.C.E.

Mr. Lacey obtained his engineering training at the City and Guilds College, South Kensington, and after five years with Messrs. G. H. Hill & Sons, Consulting Engineers, entered the service of the Gas Light and Coke Company in 1911 as assistant to the then Distributing Engineer, Mr. H. S. Reeson, whom he succeeded in 1918. In 1923 he was appointed Deputy to Sir Francis Goodenough, devoting special attention to the technical activities of the Department which, in 1926, was established at Watson House. On the retirement of Sir Francis in 1932, Mr. Lacey became Controller of Gas Sales. Mr. Lacey is a Fellow of the City and Guilds of London Institute, and a Member of the Institution of Heating and Ventilating Engineers. He has twice been awarded the Institution Gold Medal (1923 and 1928) for Papers on Gas Distribution.

stand in the way of its fullest development. A vote of thanks was seconded by Mr. S. E. Whitehead, of Southampton, and was enthusiastically accorded.

Amalgamation.

The first Paper to be presented and discussed was by Mr. F. C. Briggs, dealing with the amalgamation of the Town of Dudley Gas Light Company and its neighbour, the Brierley Hill District Gaslight Company. It sets out the circumstances leading to consideration of amalgamation, the method of amalgamation, and the re-organization and engineering work arising therefrom. The Author maintains that physical amalgamation of the smaller provincial undertakings is not easy even when such undertakings adjoin and when the amalgamation is desirable in the interests alike of the proprietors, consumers, and employees, and of the Industry as a whole. The difficulty is the innate strength of the Gas Industry itself. Competition from many sources has been increasing during the last generation and becomes more severe every year. Yet there are very many undertakings, whose products and whose service are of a very low order when judged by the standard set by the premier gas undertakings, but which still manage to pay consistently their standard or maximum dividends or earn their interest and sinking fund charges and at the same time maintain or slightly increase their output of gas. It is very difficult for directors or committee men in such cases to realize that, in the interests alike of their consumers and their proprietors, improvement should be made in the operations of their undertaking. Some improvement might, of course, be made without amalgamation or joint working, but very much wider scope is possible when working in bigger units.

Another stumbling block in the way of amalgamation and grouping, says Mr. Briggs, is occasionally the low capital expenditure per million cu.ft. of gas sold of one of the undertakings. However convenient and financially sound a low capital account may be, it is not necessarily a sign that the needs of the area for gas are being met better than, or as well as, those of an area in which the undertaking has a heavier capital expenditure. The value of stock and shares depends on their dividend earning power and what they will fetch in the open market, and for shareholders in a company with low capital to demand considerably more than this value is a definite block to progress. In a sentence, over-capitalization is unhealthy and indefensible.

Mr. Briggs, discussing the amount of capital it is necessary to expend in the supplying of gas to new districts, observes that district development work will pay in the long run, but that it will be a marathon race and not a sprint; questions of expediency of policy have to be given considerable credit. Within the length of time for which any judgment can be made such expenditure will permanently increase the capital per million cu.ft. This must be realized and faced. It intensifies the necessity for the Gas Industry to be given statutory powers, particularly as to the charging for gas, at least as wide as its chief competitor. It emphasizes the necessity of pressing local authorities for impartial consideration of the final effect of their actions when they are deciding what public services are to be introduced into council houses of low rentals.

Results at Dudley.

As a result of the Dudley amalgamation and the concentration of gas manufacture at the Dudley Works, the cost of gas into holder has been considerably reduced. The gas in Brierley Hill has been considerably improved in composition, specific gravity, and naphthalene content as is inevitable with the replacement of low grade gas made in horizontal retorts by gas made in vertical retorts. This has resulted in a reduction of distribution difficulties and an increase in the consumers' satisfaction. This result could have been brought about, of course, by the replacement of the plant without amalgamation, but it needs no figures to substantiate the statement that extension of the existing Dudley vertical retort plant was cheaper than the installation of a new plant at Brierley Hill. There has been a definite saving in purchasing and substantial reductions have been obtained on prices for the same goods previously paid at Brierley Hill. How much of this is due to larger scale buying, and how much to a different point of view in the buyer, it is impossible to compute.

No opinion upon the effect of amalgamation can be

THE SENIOR VICE-PRESIDENT.

H. C. SMITH, M.Inst.C.E.

Mr. H. C. Smith received his training in gas engineering with the City of Birmingham Gas Department. He was appointed Works Superintendent at the Swan Village Works in 1912, and, with the exception of the War period, during which he served in the Royal Field Artillery, occupied this position until 1920, when he was appointed Works Superintendent at the Tottenham Gas-Works. He became Chief Engineer at Tottenham in 1922. He is a Past-President of the Eastern Counties Gas Managers' Association and of the Southern Association of Gas Engineers and Managers. He was for several years Chairman of the Board of Examiners of The Institution of Gas Engineers.

drawn from figures of the average consumption per consumer. Any conclusion is vitiated by two facts; first, the much larger percentage of gas sold for industrial purposes in the Dudley area than in the Brierley Hill area, and its rapid variations with the state of trade; and, second, the different and varying policies of the various local authorities in the two areas in connection with the method of lighting the houses which they continue to build. The average consumption of the ordinary meter consumer has

increased in both areas from 1929 to 1934, while that of the prepayment meter consumer has decreased in both areas; the decrease has been very much less in Brierley Hill than in Dudley. The total number of consumers during the period has increased by 24%.

Other advantages of physical amalgamation such as the adoption of a common sales policy over a wider area, the possibility of employment of specialists on the staff, the smaller stocks of appliances required to give the same rapid service prove in practice to be true.

There is a limit, in the Author's view, to the size of an undertaking which can usefully be formed in the provinces by physical amalgamation. Personal contact is, of course, of the greatest importance in any business; but in the provincial gas undertaking it is necessary for the humblest consumer, if he feels he has a legitimate grievance which he cannot get settled to his satisfaction, to be able eventually to get into personal contact with the chief executive officer who can settle the matter on the spot without having to refer to a superior or to a Board or Committee, and who has the power to break cast-iron rules for expediency's sake. Any amalgamation so large that this is impossible is too large.

Mr. Briggs believes that an undertaking situated in a populous area with an annual make of 500 million cu.ft. has not reached the limit, nor, in fact, has it reached the point where full advantage can be taken of large scale operations on the district.

THE NEW JUNIOR VICE-PRESIDENT.

R. ROBERTSON.

Mr. R. Robertson was trained as a mechanical engineer and had several years' general workshop and drawing office experience before entering the Gas Industry. He was appointed Chief Draughtsman to the Bristol Gas Company in 1905, Superintendent of their Canon's Marsh Works in 1907, and succeeded the late Mr. D. Irving as Engineer and Works Manager to the Company in 1918. Mr. Robertson is a member of the Institution of Civil Engineers and a member of the Institution of Mechanical Engineers, being now Chairman of the Western Branch of the latter body. He was President of the Southern Association of Gas Engineers and Managers in 1926 and is at present a member of the Gas Education Committee and Chairman of the Board of Examiners.

Municipal Ownership.

Introducing his Paper, Mr. Briggs referred to the municipalization of the Birmingham and Staffordshire Gas Light Company in 1875, and said that unfortunately the municipal ownership of so many of the undertakings, and particularly of the largest in the area, is a considerable difficulty in the way of amalgamation or grouping. In the discussion, however, Mr. E. B. Tomlinson suggested that Birmingham need not be considered as standing in the way of joining hands. For several years the Birmingham Gas Department has been precluded from applying any profits to the reduction of rates. He sees no difficulty in formation of a Gas Board. Another point touched upon by Mr. Tomlinson was the fact that the saving due to the Dudley amalgamation, estimated at £3,000 per annum, was in actuality more than £7,000, in spite of the capital costs exceeding the estimated figures.

Discussing the position of municipally-owned undertakings, Mr. R. J. Restall, of Stalybridge, said that such undertakings might favourably consider joint area working, and should concrete proposals be formulated, a surprising example of co-operation might be set. In any event, unless the small concerns are absorbed or assisted, or some form of co-operation is set in motion, he is definitely of opinion that the overwhelming unified kick from the electrical industry will force those particular parts of the Gas Industry out of business. It seems that municipal ownership will in any case withstand the pressure of amalgamation for some time, but joint area working would be an excellent manner of bringing about simultaneous actions of a specified policy, and that is what we really require.

Mr. A. L. Holton remarked that if an undertaking having an efficiency of 100% is amalgamated to an adjoining area having an efficiency of only 50%, it is obvious that the combined results after the amalgamation will show an improvement. But taking a hypothetical case of two adjoining undertakings, both well managed and each being 100% efficient, Mr. Holton asked the Author whether he would recommend amalgamation as being beneficial. His point was that amalgamation is either right or wrong in itself, irrespective of management. Mr. Briggs replied that a small company supplying only 200 million cu.ft. of gas per annum cannot in any circumstances operate at what he would term 100% efficiency. It cannot afford to pay for a staff having the capacity of those of a larger company to investigate its problems and deal with those problems. Therefore he suggested that any company supplying up to 1,000 million cu.ft. a year gains strength by amalgamation. Again, no undertaking, however large, can afford to have on its borders another undertaking which is less than 100% efficient. Mr. G. M. Gill said there must be 50 cases which could with advantage be treated in the same way as the undertakings at Dudley and Brierley Hill. As an example he quoted the instance of an area where there are 5 undertakings selling about 1,000 million cu.ft. of gas per annum and serving a district measuring only 9 miles by 5 miles; there are 5 works there, and the overhead expenses of running 5 undertakings instead of one constitutes extravagance. In his opinion, the extent of amalgamation and absorption which is taking place is much too small, and as for the holding companies, these were brought about by the Gas Industry itself, for the people concerned sat down and talked but did nothing, and left it to the holding companies to come in and do the business. His experiences around the country have amazed him, for the gas supplied in many instances is of very poor quality. In the smaller works there is no chemist and there are no instruments, and the man in charge has no means of knowing what is the quality of the gas made. The supply of gas of bad quality is detrimental not only to the particular area supplied, but to the whole Industry.

Success of a Two-Part Tariff.

The only Paper on the Tuesday afternoon was that by Mr. J. T. Haynes, formerly Engineer and General Manager to the Rotherham Corporation Gas Department, on "The Two-Part Tariff as an Aid to Gas Sales." In this the Author points out that increased use of low-priced gas by industry barely compensates for losses in the domestic field, and efforts must be made not only to maintain but also to increase the sales to domestic consumers. The electrical industry has demonstrated how this can be achieved by multiple tariffs, and the Gas Industry should not hesitate to make use of that experience.

The sales of gas per domestic consumer at Rotherham were falling year by year. It was obvious that under the flat-rate method of charge the price of gas was too high for the average householder to use it continuously for any heating purpose, and in addition it was fashionable to displace gas for lighting in favour of electricity. Various methods of reducing the price so as to make possible an increased use of gas were considered. A flat-rate reduction would have been expensive and offered little prospect of increased revenue; a gas rate similar to a water rate was impracticable; a reduction in price for all increased consumption could be construed as illegal; and a block system was considered to be, among other things, too great a danger to existing revenue. The two-part tariff was the only method which seemed likely to appeal to the small consumer without offering too great a concession to existing large consumers, and yet would enable every consumer, poor and rich, to use gas freely for all household purposes.

The recommendations of the National Gas Council on the structure of a two-part tariff, issued in 1928, were examined, but it was decided that in the circumstances existing at Rotherham, a tariff scale calculated in accordance with those recommendations would not be sufficiently attractive to the gas consumers. The calculations showed that payment of a service charge of 24s. 3d. per annum would entitle a consumer to have gas at 18·1d. per 1,000 cu.ft.—half the current standard price. This price would make the use of gas more expensive than coal, so that the

THE 1935 INSTITUTION MEDALLISTS

GOLD MEDAL.

G. DIXON.

Mr. G. Dixon served his apprenticeship to general engineering with the Mersey Engine Works Company, Liverpool. From 1905 to 1908 he took an Engineering Course at Liverpool University, and graduated B.Eng. From 1908-10 he was articled to the late Isaac Carr, M.Inst.C.E., Widnes Gas and Water Department, and Consulting Engineer, and for the following two years was Technical Assistant, Gas and Water Department, Widnes. Then he was appointed Chief Assistant to the late J. H. Crowther, Wallasey Gas and Water Department, a post he occupied for seven years. During this period he was elected an Associate Member of the Institution of Civil Engineers. In 1919 he became Engineer and Manager to the Lancaster Corporation Gas Department, and carried out complete re-building and re-organization. In 1932 he was appointed Engineer and Manager to the Nottingham Corporation Gas Department.

SILVER MEDAL.

T. P. RIDLEY, F.C.I.S.

Entering the Gas Industry as a Junior Clerk with the Newcastle-upon-Tyne and Gateshead Gas Company, Mr. T. P. Ridley eventually rose to his present position of Commercial Manager and Secretary. He is also a Director of the Shotley Bridge and Consett District Gas Company; Amble and Warkworth Gas Company; Newbiggin-by-the-Sea Gas Company, Ltd.; and the National Benzole Company, Ltd.; a Member of the Executive Committees of the National Gas Council, British Commercial Gas Association, Sulphate of Ammonia Federation, British Pitch Association, and British Road Tar Association, and a Member of the Durham District Committee of Investigation under the Coal Mines Act, 1930. Was a Member of the National Gas Council Committee on Gas Charges whose report was issued in 1928, and a Member of the Board of Trade Committee on Gas Legislation upon whose recommendations the provisions of the Gas Undertakings Act, 1934, giving the Industry liberty to introduce Multi-Part Tariffs were based. He submitted Papers on behalf of the Gas Industry to the World Power Conferences in London, 1928, and Berlin, 1930, and also to the American Gas Association on the occasion of the visit to America of the Delegation from The Institution of Gas Engineers.

H. E. JONES LONDON MEDAL.

W. L BOON.

By birth a Lancastrian, Mr. W. L. Boon gained his early engineering experience in Bolton and Manchester. He worked abroad for Messrs. J. & P. Coats, the textile manufacturers. During the early part of the war he was in Russia, and was retained there by the Government. Later he served with the army, and went to Siberia with the special mission headed by General Knox. Mr. Boon was an early pioneer of pulverized fuel firing for metallurgical applications for which purpose it is still admirably suited, and was appointed Technical Adviser to the London and Counties Coke Association, following which he was appointed to his present position of Manager of that Association. He is a Member of both the Institution of Mechanical Engineers and the Institute of Fuel.

BRONZE MEDAL.

W. HODKINSON.

Mr. W. Hodkinson is Senior Technical Assistant and Chemist with the Stretford and District Gas Board ; and the Paper for which he was awarded The Institution of Gas Engineers' Bronze Medal was one he presented at a meeting of the Manchester and District Junior Gas Association on Feb. 6, 1935, in which he outlined the results obtained and experience gained in the production of motor benzole by his Undertaking during the previous two years.

complete displacement of coal by gas would have been an impossible ideal.

Assessing the Service Charge.

In view of the fact that large industrial consumers under certain conditions could obtain purified coke oven gas at 10d. per 1,000 cu.ft. (2d. per therm), it was natural to ask what conditions would be necessary for householders to have gas at the same low price. Calculations and estimates showed that payment of a service charge to cover certain distribution costs, rates, management, interest and redemption of debt, income tax, and existing profit, *plus* an allowance of 25% on all these items for future development, would justify the supply of gas to a consumer at 10d. per 1,000 cu.ft. (1s. per 1,000 cu.ft. for slot consumers), this price covering all works costs and the balance of distribution costs. A sliding scale of service charges for dwelling houses of different sizes, based on the number of rooms, was decided upon.

In the face of strong opposition from the electrical people, an experiment was made in the application of the two-part tariff method of charge to ten Corporation tenants, by persuading them to use gas to displace coal entirely for a period of three months. This experiment confirmed all the estimates which had been made, both as regards gas consumption in relation to weight of coal displaced (1,000 cu.ft. of gas per cwt. coal), and as regards the advantage to the Gas Undertaking. It also demonstrated that the amount the consumer saved in fuel costs would enable him to pay for the installation of the gas equipment on hire-purchase terms. At the end of the test every consumer expressed satisfaction. The scope of the experiment was extended with equally satisfactory results, and the tariff was made applicable to all domestic consumers on Feb. 1, 1934.

The new method of charge was not pushed by door-to-door canvass, or any other forceful methods, because it was intended to keep the development of the scheme within the capacity of the existing staff, and also that consumers should ask for the new service on the recommendation of their friends. From the commencement of the experiments in September, 1932, to Dec. 31, 1935, 1,274 consumers, about 5% of the total, had signed two-part tariff agreements. Their gas consumptions, on the average, have been doubled, and the increased revenue to the Gas Department has paid for all additional expenditure, leaving a small balance to add to net profit. From all points of view, states Mr. Haynes, the two-part tariff is a success.

The offer of a two-part tariff, he continues, no matter how carefully calculated, is, however, not likely to be successful unless accompanied by what is usually called "Service"—prompt attention to consumers' requirements, forestalling their complaints, and advising them of modern developments. It is emphasized that these services are as necessary to maintain the goodwill of existing consumers under the flat-rate method of charge as they are to ensure the complete satisfaction of two-part tariff consumers.

Having demonstrated how a two-part tariff to meet the conditions at Rotherham was calculated and operated successfully, Mr. Haynes suggests that other towns might seriously consider the adoption of such a tariff to meet their own problems. In doing so, he observes, care must be taken to avoid too great a variety of tariffs. If gas is to be sold in competition with other fuels, and those fuels are sold at regional standard prices, then gas must be sold at similar regional prices.

The two-part tariff, Mr. Haynes concludes, is the most equitable method of charging for gas.

Value of Coke Sales.

In the Halifax two-part tariff the service charge is based on the size of the living and reception rooms only. It has been working now for 24 years, and Mr. W. B. McLusky, who was the first speaker in the discussion, maintained that it is the nearest possible approximation to the potential use of gas. Mr. Haynes' scheme, he said, has been astonishingly successful, but he queried whether it would not have achieved even greater success had the service charge been less and the price of the therm more. The next speaker was Mr. C. S. Shapley, who pointed to the wrong practice of using the profits of municipally-owned undertakings for the relief of local rates. He cannot see why the gas consumer should be called upon to pay rates twice. Another point referred to by Mr. Shapley was the difference in charge to the ordinary consumer and the prepayment consumer. Why, he asks, should the latter have to pay more for his gas than the ordinary consumer? And he suggested that the accountancy staffs of gas undertakings should investigate the matter and arrive at which type of customer costs the undertaking the more. He also expressed disagreement with Mr. Haynes' contention that the Gas Industry might usefully concentrate on selling gas and not dissipate its energies by trying to sell two competitive fuels—gas and coke. From the figures given in the Paper, Mr. J. H. Clegg, of Southport, works it out that repairs to prepayment meters cost more compared with ordinary meters in the ratio 5:2, and he called the attention of Mr. Shapley to the fact. He also mentioned that he had introduced a two-part tariff system based on the number of rooms in houses in which gas could be used, and the service charge worked out similarly to that mentioned by Mr. Haynes. But after two years only 50 consumers had adopted the tariff, and, said Mr. Clegg, that is largely the experience of others who have promoted two-part tariffs. He does not condemn them, but is of opinion that everything depends on the particular conditions at the time the tariff is instituted. The position at Rotherham, he remarked, was peculiar. Very few undertakings are in the fortunate position of being able to put gas into the holder at 6d. per 1,000 cu.ft. The fortunate position at Rotherham was also referred to by Mr. Dixon, of Nottingham, who observed that more and more people were adopting the two-part tariff at Rotherham each year; yet as this move goes on, the net increase in the revenue is becoming less and less. The inference he draws is that when a consumer adopts the two-part tariff in a wholesale way, it becomes equivalent to a reduction in the price of gas.

The Bradford Tariff.

Mr. Currier, of Bradford, also joined issue with Mr. Haynes on his statement regarding the sale of gas and coke. Those engineers who manufacture gas, he said, realize only too well the beneficial effect the sale of coke has on the revenue account and in helping to keep down the cost of gas. He also outlined the results achieved at Bradford through the operation of an optional two-part tariff which was established in 1933. In regard to the fixing of the service charge, there are two classes of houses in the Bradford rate, contrasting with five classes in the Rotherham. Since the Bradford two-part rate has been in operation the increase in gas consumption amounts to 126 million cu.ft., equivalent to 7 per cent., and these figures, emphasized Mr. Currier, do not reveal that unknown quantity which is the amount of load which has been retained under the new tariff, and which would have been lost under the old system of charges. The number of consumers on the two-part rate is 23,500, equal to 24 per cent. of the total. Of these, 20,800 are domestic and 2,700 industrial. Consumers are still changing over to the two-part rate at the rate of 75 per week. So far the two-part rate has not applied to the prepayment consumers, though many of them are changing over to it.

At this stage of the proceedings the Secretary announced the receipt of a message of goodwill and wishes for a successful meeting from the German Association of Gas and Water Engineers. He also mentioned that he had received a telegram from two members who were on the "Strathmore" sending best wishes for a successful meeting, Mr. Samuel B. Chandler and Mr. Walter Hole, both of whom had already sent letters regretting their inability to attend the meeting.

A Private Session was then held for the purpose of discussing the proposed Amendments of the By-laws governing admission to the Institution.

Election of Officers.

On the resumption of the proceedings on Wednesday morning, announcement was made of the results of the election of officers and to the various classes of membership of the Institution. The President for 1936-37 is Mr. Stephen Lacey, and Mr. Robert Robertson was elected Junior Vice-President. The Auditors for the new session are Messrs. H. D. Madden and Alfred Morland, and the Ordinary Members of Council for the period 1936 to 1939 Messrs. F. C. Briggs, D. C. Cross, A. L. Holton, and R. W. Hunter. Mr. John Terrace was elected as Honorary Secretary for 1936-37, following upon the resignation of Mr. Price, to which we have referred previously. Other new elections comprised 3 members, 21 associate members, and 4 associates.

Mr. Lacey said how delighted they all were to have Sir Francis Goodenough as an Honorary Member of the Institution. It was, he said, quite unnecessary for him to remind them of the great work he has done, particularly in connection with the Education Scheme. The other Honorary Members elected were the Presidents of the International Gas Union and the Overseas Gas Associations.

District Members of Council nominated for 1936-37 are Messrs. B. Clarke, Stamford (Eastern Counties); A. Law, Limerick (Irish); G. S. Eunson, Northampton (Midland); James Jamieson, Edinburgh (North British); W. W. Atley, Stockton-on-Tees (North of England); R. J. H. Clark, Ply-

mouth (Southern); and Octavius Thomas, Porth (Wales and Monmouthshire).

At this stage of the proceedings, the Chairman proposed that a telegram should be sent to Commodore Sir Edgar Britten, R.M.S. "Queen Mary" at Southampton. The telegram was in the following terms:—

> President, Council, and Members of The Institution of Gas Engineers assembled at the Seventy-Third Annual General Meeting send cordial greetings and best wishes for a successful maiden voyage. Would you please convey our salutations to our colleagues of the American Gas Association.

Selling to Industry.

Prior to joining the Gas Industry, Mr. T. H. Pardoe—whose Paper on industrial sales problems was the first item for discussion on Wednesday morning—was employed by a firm of furnace manufacturers; and at the outset he emphasizes that, in these days of fierce competition, it is essential that a gas salesman should know not only the details of his own job, but also of what competitors are capable. In his opinion, the Gas Industry has tended to under-rate its competitors in that it has not been sufficiently concerned with their developments. This can partly be explained by the fact that most of the members of industrial gas sales staffs are products of the Gas Industry, and probably not more than 5% have operated furnaces on oil, producer gas, and coal. Their knowledge of furnaces using competitive fuels is largely theoretical; and Mr. Pardoe considers that all industrial gas salesmen should have practical experience in the operation of furnaces on other fuels. His argument is that knowledge of furnaces using competitive fuels greatly increases a salesman's prestige when interviewing prospective customers, for he is able to put his finger on the very spot where competitive fuels may fail in the particular application under discussion. The salesman who can discuss alternative fuels with equal knowledge can more easily satisfy a customer that he is getting a fair and logical statement of town gas and not a lot of high pressure hot air from a super salesman.

The industrial gas salesman, he continues, must be careful in assessing the value of competitive fuels. For example, when a new gas furnace is installed to replace an old one on some other fuel, an increased efficiency is generally obtained, not necessarily represented by cost of fuel per ton of product treated, but also in the improved quality and finish. This increase in efficiency can give a false sense of security and satisfaction, and it is easy to imagine an industrial salesman sending in his monthly report that he has just installed a new gas furnace to replace one fired by competitive fuel and has reduced the customer's costs by 30%. The wise salesman is only satisfied and content to base his business approaches on a comparison made between a new gas furnace and a new furnace using competitive fuel, as it is only by such comparison that one is able to judge the relative position of the Gas Industry to its competitors. Modern solid fuel fired furnaces are vastly superior to their predecessors; they can and do produce excellent work and are usually installed where town gas is prohibitive in price and where ground space is not at a premium. Mr. Pardoe asks the Gas Industry to see that these installations of raw fuel, producer gas, and oil fired furnaces are cut down to a minimum by giving its industrial sales staff a real chance—by offering cheap gas. Once a large amount of capital is invested in new plant using a fuel other than gas, the competitive position is infinitely worsened, for if, at a later date, cheap gas is offered, the consumer cannot accept the offer because he is faced with the cost of scrapping existing plant. Cheap industrial gas now means growing gas sales.

Helping the Furnace Makers.

Furnace makers, says Mr. Pardoe, will give 100% backing to gas undertakings who offer gas for industrial processes at competitive rates, for they fully realize what a perfect fuel town gas is. Complaints of a certain gas engineer that a furnace maker has been selling oil or producer gas furnaces in his area have shown, on enquiry as to the price of gas, that it was not being sold at competitive rates and that the furnace maker was forced to offer another fuel. Except in a few notable instances, gas undertakings generally are missing an opportunity to secure a sound industrial load by fixing gas charges on an erroneous basis that no industry can afford to pay.

The tendency of some gas undertakings to manufacture and supply their own furnaces is, in the Author's view, alarming, except special appliances for exceptional requirements. If this tendency is developed, he maintains, it may prove to be a two-edged weapon in that it will tend to drive furnace makers into our competitor's hands. The

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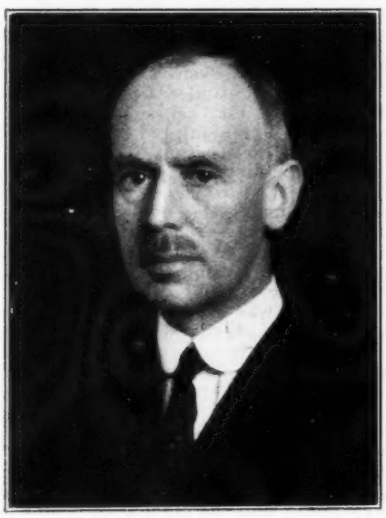


JOHN TERRACE, M.Inst.C.E., M.I.Chem.E.

Mr. Terrace was for many years Chief Engineer of the South Suburban Gas Company, and is well-known in the Industry. Born at Leven, Fifeshire, and educated at Glasgow, he is the son of the late Mr. David Terrace, of Middlesbrough, a prominent gas engineer. After leaving school he served an engineering apprenticeship with Messrs. Ashmore, Benson, Pease, & Co., of Stockton-on-Tees, at the conclusion of which he obtained experience in the erection of gasholders at Manchester, Falkirk, and Perth. He then joined Messrs. Humphreys & Glasgow as a constructional engineer, and during the next five years was engaged on carburetted water gas plants. During that period he visited Australia and New Zealand to superintend work, and while at Sydney, N.S.W., he undertook the duties at the Mortlake Works of the Australian Gas Light Company during the absence of the Engineer on sick leave. Shortly after his return to England he was appointed Assistant Engineer to the Tottenham and Edmonton Gas Company, and during his association with Mr. A. E. Broadberry, who was then Chief Engineer of the Company, had extensive experience in works reconstruction, installation of machinery, and gas manufacture. In 1909 he was appointed Engineer and Manager of the Great Grimsby Gas Company, and after ten years there returned to the South to take up the duties of Chief Engineer to the South Suburban Gas Company, on the retirement of Mr. Sydney Y. Shoubridge. He first entered the Council of The Institution of Gas Engineers in 1917, and has been a member of various Committees, taking an active part in the Institution's application for its Royal Charter. His work on the Education Committee and interest in the Junior Gas Associations are well known. In addition to being a member of the Institution of Civil Engineers, he is a member of the Institution of Chemical Engineers and a Fellow of the Institute of Fuel.

T. H. PARDOE.

Mr. T. H. Pardoe, who presented his Paper on "Heating Problems Arising in Industrial Gas Sales" on the Wednesday morning, is Chief Industrial Gas Sales Engineer to the Stretford and District Gas Board. Educated at Halesowen and Dudley Technical Schools, he served an engineering apprenticeship with Walter Somer, Ltd., of Halesowen. He also served for a period with John Thompson Water Tube Boiler Co., Ltd., and with the Incandescent Heat Co., Ltd., where he was Engineer in charge of erection and starting up of all kinds of furnaces.

Gas Industry must accept responsibility for the suitability of any installation it recommends and the closest liaison is necessary with the furnace manufacturer to maintain the consumers' goodwill. The furnace makers carry large technical and estimating staffs, and they have done considerable pioneer and development work on industrial furnaces and processes which has ultimately been of great benefit to the Gas Industry; the desirability of co-operation for mutual interest cannot be over-emphasized.

Examples of industrial processes to which gas has been successfully applied at Stretford and of the problems they involve are discussed in the Paper, and an account and analysis is given of the development of the industrial gas load in the area of the Stretford and District Gas Board. It is a record of great achievement.

The Question of Training.

The first speaker in the discussion was Mr. Dieterichs, who queried whether industrial gas sales representatives should be furnace-maker trained. After all, with the exception of a few undertakings, furnaces formed quite a small outlet for industrial gas. He also feels that while the process of bright annealing may be very important to such places as Birmingham, Sheffield, and other large industrial towns, if it is really as important as it appears to be thought, then it ought to be treated as a national problem. In this country there are about 30 to 40 competent research associations, and as the problem was a metallurgical one, it was a matter for an association such as the British Non-Ferrous Research Association to investigate

THE SECRETARY.

J. R. W. ALEXANDER, M.A., LL.B., F.C.I.S.

and develop. Moreover, beyond a few towns in this country the load may not be quite so much as anticipated, and careful thought should be given to the matter before incurring any great expense. In London, for example, a dozen bright annealing furnaces would practically cover the requirements, whereas there are approximately 2,000 side-flue ovens capable of being fired by gas, the average consumption per oven being a matter of 185,000 cu.ft. per quarter. In common with Mr. Dieterichs, Mr. H. R. Hems, of Birmingham, does not consider it essential that industrial gas engineers should have seen service with a furnace maker. He also firmly disagrees with the suggestion made by Mr. Pardoe that we have tended to under-rate our competitors. Many of them, he said, have worked through the early stages of industrial gas development, and have withstood successfully the onslaught of more than one competitive siege, even now they are getting ready for a new one, and surely the move to establish Industrial Centres up and down the country is definitely evidence that we are alive to competition.

Among the points raised by Mr. Dean Chandler, who was the next speaker, was the question of gas prices. In arriving at charges, the final question must always be, Is it economical for us? If it is not economical, we shall be better off without the business, as electricity undertakings are tending to find with some of their artificially created special loads. And he asked if too much is not being made of the bright annealing business. In his opinion, the amount of this work is comparatively small compared with the less exacting, reasonably scale-free annealing work. Are we, he asked, to some extent being deluded by a phrase?

A Mistaken Belief.

Dr. A. Fells, of Sheffield, who for several years has been closely associated with investigations dealing with furnace atmospheres, spoke at some length on the problem of prevention of surface damage to metals. It is almost universally believed, he observed, that purging gases must be as free from sulphur as possible, and nearly all atmosphere control processes on the market for use with non-ferrous metals have been designed to give this freedom from sulphur. Processes used in electrically heated furnaces almost invariably give sulphur-free purging gases, either the initial source of the gases being naturally free from sulphur, as in the case of cylinder ammonia, or some stage is incorporated for the removal of sulphur if it is present in the initial source of supply. The electrical furnace people have fully realized that freedom from sulphur is absolutely necessary, but *not* for the sake of the metal being bright annealed. It is primarily to prevent damage to the nichrome heating elements of the furnace itself that freedom from sulphur is desired. It appears to have become popular belief, continued Dr. Fells, that any atmosphere control process for use with non-ferrous metals, to be successful, must give a sulphur-free gas mixture, but it has been shown in practice that many non-ferrous metals, such as copper, gun-metal, cupro-nickel, standard silver, and phosphor bronze, can be perfectly bright annealed in the products of complete combustion of a normal town gas without any sulphur being removed. Dr. Fells urged that furnace makers should try a simple form of open type gas-heated furnaces, merely using the products of perfect combustion as the source of bright annealing gases.

The last speaker was Mr. Fallon, of the Incandescent Heat Company, who suggested that much benefit would accrue if furnace manufacturers threw open their factories to the young students and salesmen in the Gas Industry. His firm would certainly welcome this means of collaboration. He also offered the advice that the right way in which to attack industrial furnace problems is to work back from the product to the furnace, and from the furnace to the fuel. In this way lies a fair chance of success. In regard to bright annealing, this process has been carried out for many years, and the amount of bright annealing in this country exceeds 20,000 tons a year, and little is said about it. But, concluded Mr. Fallon, if somebody does a little bright annealing in a tube it is advertised all over the country.

Gas and Safety.

On the resumption of the meeting on the Wednesday morning Mr. C. A. Masterman presented his Communication dealing with "Gas Safety Precautions." The Gas Industry cannot remain content so long as there occurs a single preventable accident; and it was the purpose of this Paper to raise the question for discussion whether there is more that the Industry could do not only to fulfil the primary requirement of safety, but the wider requirement of ensuring fully satisfactory service from all their gas appliances. Yet, the annual accidental deaths from town gas are less than a quarter those due to either falling downstairs or drowning, and do not much exceed those due to horse-drawn traffic. Fatalities due to the products of combustion are less than those due to motor car fumes, less than half those due to insects or to blows at cricket or football, and about one-tenth those due to falling out of bed. Again, the fatality rate from manufactured gas in Great Britain in relation to output has been variously estimated as from one-fifth to one-twentieth the average of the world. Moreover, the relatively small number of fatal gas accidents is reduced to about half if fatalities truly accidental and primarily due to gas alone be considered.

The policy of the Gas Light and Coke Company to ensure the safe and satisfactory use of gas is outlined by Mr. Masterman, and he discusses the use of governors on appliances. The use of governors as an integral part of the appliance has been proposed in Australia as an essential prior to approval of the appliance. Such governors do not require to be precision instruments, and can therefore be manufactured at such a cost as to be an economy compared with the cost of the attention to be given in adjustment and the like in their absence. Their use leads to the gas appliance being capable of installation and operation without more attention than is required for electrical appliances.

Increasing Use of Governors.

The Gas Light and Coke Company, Mr. Masterman explains, has now issued over 100,000 cookers with pressure governors and fixed injectors, together with many

thousands of single point instantaneous water heaters having a pressure governor as an integral part of the gas-water valve. To an increasing extent governors are now being used in the design of flueless heaters. The decision to adopt these devices has been justified; they have fulfilled their object in decreasing installation and maintenance costs and in guaranteeing full service to the consumer.

Governors, whether of the pressure or volume type, must inevitably be susceptible in some degree to the presence of foreign bodies or gum in the gas, and their introduction is therefore qualified by the condition of the gas in this

Mr. W. A. Barnett, of Barnet, with Mr. W. T. Deeks, Chairman of the Shanklin and Ventnor Gas Company.

respect. Where governors are not used, the process of correctly adjusting the gas rate of the appliance can be facilitated by the use of fixed orifices in conjunction with a pressure testing point. The policy of standardizing orifice size, whether with or without governors, is, of course, facilitated by the size of the Gas Light and Coke Company, which is in a position to buy large numbers of appliances, all of which will operate on gas of one fixed calorific value and limited variation in specific gravity and flame velocity. Mr. Masterman remarks that the present variations throughout the country in calorific value and other qualities might throw an intolerable burden on the appliance manufacturers if they were to be required to supply to each undertaking appliances pre-set to each particular gas quality. If this be so, the Gas Industry and the gas consumer pay a heavy price in money and in service for the liberty in manufacturing processes each undertaking can exercise.

Mr. Masterman, in a general review of the situation, observes that the influence of the larger undertakings and the reputable gas appliance manufacturers is continually being exercised to stimulate improved design, construction, and installation of gas appliances, not only in the interests of safety, but to ensure generally satisfactory service. These efforts, however unco-ordinated they may seem, have had a marked effect. There remains, however, the need for closer co-operation throughout the Industry, and such co-operation is showing substantial improvement. He hopes that, in the near future, there may be set up for domestic gas appliances and installations an organization not dissimilar from that which for some time has been successfully operating in connection with the industrial use of gas. The discussions and personal contacts so achieved will be more fruitful than would be the imposition of rigid rules or inflexible specifications. The Domestic Gas Appliances Committee should undertake, as one of its first duties, the drafting of model regulations of a general nature regarding gas equipment. This should put the necessary elementary safeguards on a proper footing and avoid the confusion which repeatedly arises from well-intentioned regulations of an uninformed kind. There are some who, especially in a lively recollection of some recent gas fatality, feel inclined to advocate a greater degree of detailed regulation and authority to inspect installations than exists at present. The drafting of such regulations and authorizations is by no means a simple matter, and the Author is convinced that—as has been the experience in other countries—such attempts at rigid detailed control would soon be found to be extremely onerous and cramping to progress. The Industry, he says, should be prepared to accept such burdens if they were likely to result in the removing of the hazard and saving of life, but the Author is convinced that they would not be beneficial. A policy of closer personal co-operation between all those concerned with gas utilization is preferable, whereby all can achieve a better understanding of the problems and better profit by the experiences of others.

Flueless Heaters.

The discussion was opened by Dr. H. Hartley, of Radiation Ltd., who mentioned that as early as 1927 his firm issued a brochure entitled "Hygienic Standards of Gas Apparatus," in which was put forward the first suggestion that standards of combustion should be specified for appliances in order to ensure that under conditions of use combustion would for all practical purposes be complete. If, however, a national standard were enforced, the makers would have to work down to it. At present, he said, good results are attained with the consent of all parties concerned, and it would be a step in the wrong direction to try to enforce any standard. Another matter touched upon by Dr. Hartley was the extending use of flueless heaters. He remarked that if one were concerned only with questions of safety it would be permissible to burn gas fluelessly in many circumstances to the extent of 1 cu.ft. of gas in 50 cu.ft. of space. With the town gas generally supplied, however, he would hesitate to agree to burn more than 1 cu.ft. of gas in 150 cu.ft. of space, because he feels that to many people the sulphur products would be noticeable and objectionable. The use of flueless heaters with sulphur-rich gas, he said, may bring the Gas Industry into disfavour, and if apparatus is used unwisely the exceptional factor of safety now enjoyed may be wiped out. In regard to the fixed orifice injector, Dr. Hartley observed that before this device could be standardized for general use throughout the country, much will need to be done to ensure uniformity in quality of the gas supply. The fixed orifice certainly possesses definite advantages, but he thinks that under present-day conditions no appliance manufac-

Mr. Octavius Thomas and a Friend.

turer could meet the demand to supply all gas undertakings with appliances with fixed orifices.

The Fixed Orifice Principle.

Mr. Dean Chandler, who mentioned that the South Metropolitan Gas Company has advocated the fixed orifice principle for 25 years or more, does not agree with Dr. Hartley's view that the more general adoption of this principle would meet with almost insurmountable difficulties. He mentions that for many years his Company has considered as fundamental to the satisfactory progress of the Gas Industry the principles underlying the practice which is now in operation at Watson House. Mr. Chandler

maintains that, in the interests of safety, pilot lights should always be arranged to take full pressure of the gas supply, and have a fixed consumption at this pressure. He also spoke of the existence of shoddy appliances which are available to the public, though not supplied by gas undertakings; and he urged that more should be done to eliminate this type of appliance. Insistence on the need for doing away with shoddy appliances also formed part of the remarks made by Mr. Townsend, of Colchester, who thinks that the Institution ought to do something in the way of bringing out specifications for domestic appliances and fitting work. In this respect he cited the important work recently carried out by the London and Counties Coke Association in collaboration with the British Standards Institution in connection with specifications for the domestic coke boiler.

Mr. R. N. LeFevre, who is in charge of the training work at Watson House, remarked that the training and increase in standard of knowledge of the gas fitter has undoubtedly to some extent accounted for the reduction in the number of accidents caused by faulty installation and faulty adjustment of appliances. Facts relating to this reduction were given by Mr. W. J. A. Butterfield, who mentioned a report which he made to the Board of Trade in 1924. In this he recorded that the Gas Industry should of its own accord, without compulsion, institute arrangements for the elimination of unsafe appliances, and for the periodical inspection and maintenance of piping and apparatus on consumers' premises. At the time his recommendations were not kindly received by the National Gas Council—in fact, they were turned down. It is evident, said Mr. Butterfield, that the Author and those who have been collaborating with him throughout the greater part of the Industry have completely thrown over these views of the National Gas Council, and are in fact working on the lines of his recommendations.

Before the meeting closed on Wednesday morning, Mr. Lacey announced the receipt of a telegram expressing good wishes for the success of the meeting from Mr. Hultman and Mr. Goth, of the Swedish Gas Association.

At the commencement of the session on Thursday morning, the Chairman announced the receipt of a telegram from Sir Edgar Britten expressing his thanks for the good wishes of the Institution, and saying that he would convey greetings to the American Gas Association.

Carbonization of Cannel.

There were two Papers on Thursday morning, the first being by Mr. J. Jamieson and Dr. J. G. King on the "Products Obtained by the Carbonization of Scottish Cannel in Continuous Vertical Retorts."

Following an offer of facilities for co-operative research, made by Mr. Jamieson to Dr. F. S. Sinnatt, Director of Fuel Research, arrangements were made that several programmes of research should be carried out at the Granton Gas-Works, Edinburgh. The details of the programme and of the test arrangements were arranged by the Authors in consultation with Mr. T. C. Finlayson, representing the Woodall-Duckham Companies. Three programmes have been arranged, and the Paper deals with the first—namely, an investigation of the carbonization of Scottish cannel in Woodall-Duckham continuous vertical retorts.

A series of carbonization tests has been carried out over a period of about 14 months, the tests being conducted, at intervals, when convenient to the normal work of the Gas Undertaking.

The cannel was obtained from the Newbattle Colliery, Midlothian coalfield, and was crushed to an upper limit of size of 3 in. It was a good quality cannel of low ash content and capable of yielding in the laboratory from 51 to 70 gallons of tar per ton of dry ash-free material. This cannel has only slight caking properties, so that it was necessary to carbonize a graded product in order to produce a sized coke.

It was found possible to carbonize the cannel at a rate of about 9·0 tons per retort per day, and, when using 30% of steam, to produce a gas having a calorific value of about 480 B.Th.U. per cu.ft. The conditions of temperature were those normal to gas production in this type of retort. The yields of gas and the calorific value of the gas varied with the amount of steam used.

Variation of Yield of Gas and Calorific Value with Amount of Steam Used.

Steam, %	13·7	20·7	30·7
Gas . . . cu.ft. per ton	18,880	22,830	25,500
Gas . . . therms ,,	97·0	113·2	122·7
B.Th U. . . per cu.ft.	514	496	481

These high yields represented 788, 1,013, and 1,048 therms respectively per retort per day, an output which may be regarded as abnormally high even for this type of retort.

In addition to the high yield of gas as much as 40-50 gallons of tar was obtained per ton of cannel treated. The calorific value of this tar is about 17,600 B.Th.U. per lb., so that the yield of total volatile therms per ton of cannel varied from 184 at 13·7% of steam to 204 at 30·7%. These yields are much higher than it is possible to obtain from bituminous coal.

By the stripping of the gas a spirit was obtained which differed markedly from benzole in containing a high proportion of paraffin and unsaturated hydrocarbons. The yield of refined spirit was about 4·1 gallons per ton of cannel, and its recovery would reduce the calorific value of the gas by about 38 B.Th.U. and the thermal yield of gas by about 9 therms. If a gas of 480 B.Th.U. per cu.ft. were essential and stripping were desired, the input of steam would require to be limited to about 14%. The yield of stripped gas would then be 90 therms per ton of cannel.

The coke produced was of rather smaller size than the graded cannel charged. A comparison of the mean sizes is given. The coke is therefore a fairly closely sized product. Tests have shown it to be strong and hard, and to be readily combustible even in a normal open grate. Owing to the high proportion of volatile matter in cannel the yield of coke is low, about 9 cwt. per ton; the yield of sized coke (over ¾ in.) was about 7·2 cwt. per ton of cannel.

Size of Coke Produced from Graded Cannel.

—	Over 2½ In.	2½ to 1½ In.	1½ to ¾ In.	<¾ In.
Cannel . .	36·8	27·2	17·8	18·2
Coke . . .	3·2	24·6	51·8	20·4

The cannel tar had a low specific gravity of about 1·0, and contained about 5·8% of wax, which settled out in the cold. Special precautions were therefore necessary for its separation from the liquor. The tar may be treated by distillation in the usual manner, but it has been shown that, unlike vertical-retort tar from bituminous coal, it is as amenable to hydrogenation as a low-temperature tar. The products of hydrogenation may be either motor spirit and wax, or motor spirit, diesel oil, and wax. The high yields of oil and spirit make the carbonization of cannel interesting from the point of view of an indigenous source of oil, provided a continuous supply of cannel can be obtained over a number of years. The cannel tar does not contain lubricating fractions, but its composition suggests that it is a promising raw material for the synthesis of lubricating oils.

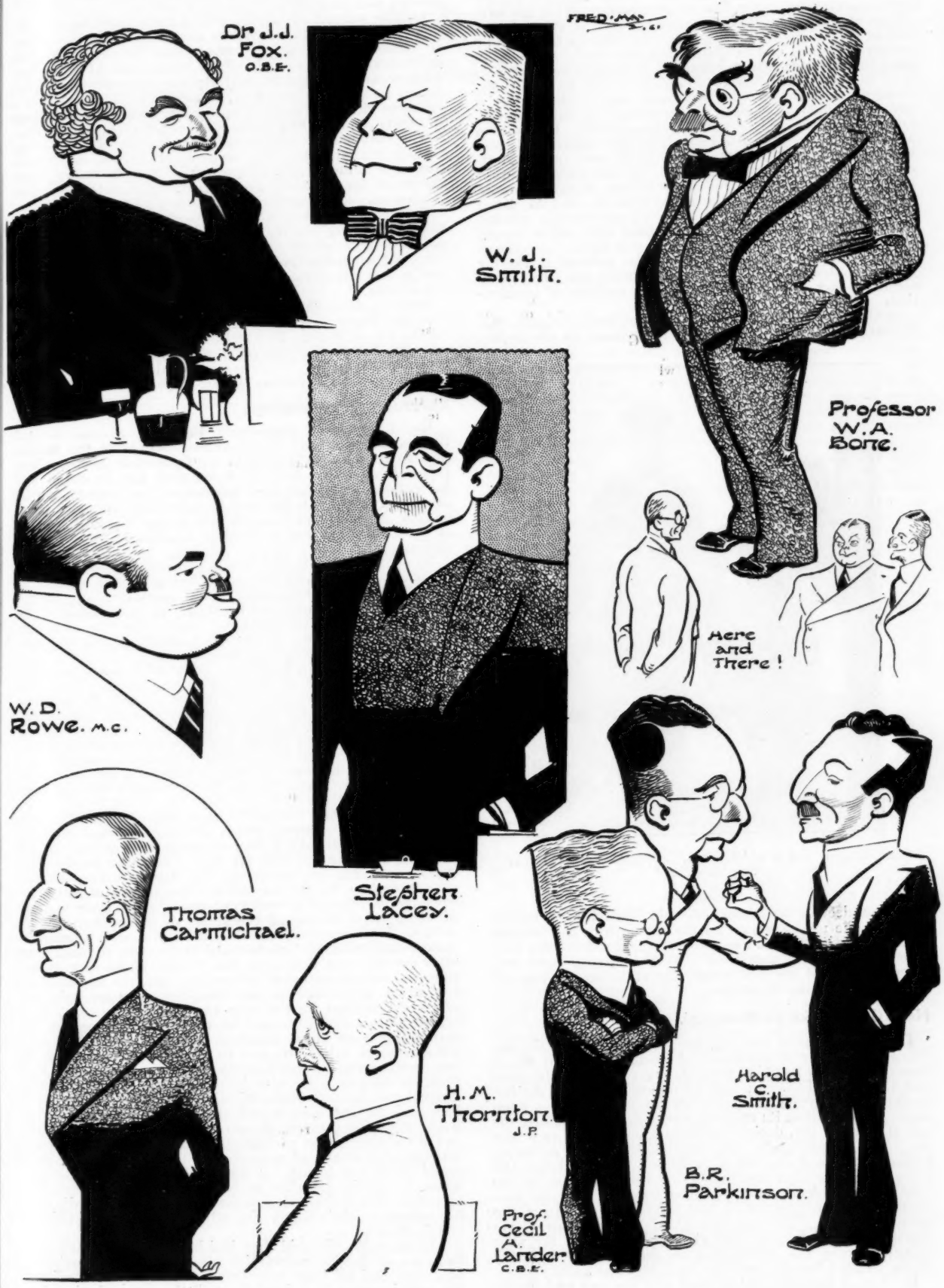
The cost of producing gas from cannel has been compared with the cost of producing gas in similar retorts from Scottish bituminous coals. Although the cannel costs 4s. 6d. per ton more than the average price of the coal carbonized at Grantham, the net cost per therm of gas is, on the average, slightly less. If the cannel be credited with the possible value of the tar as a raw material for hydrogenation purposes the gas may be produced at less than one halfpenny per therm, provided the gas is produced under similar cost conditions and the coke is marketable.

Unfortunate Press Notices.

In the course of his introduction to the Paper, Dr. King referred to the unfortunate Press notices based on the Paper and regarding the national aspect of the problem. He explained that both Mr. Jamieson and himself had been very careful to refer every conclusion to the particular cannel examined. Captain W. H. Cadman, of the Anglo-Iranian Oil Company, also expressed regret at the garbled versions broadcast through the country by the Press giving deductions of a nature quite unfounded and which were not only misleading but did the Authors and the Gas Industry a gross injustice. Captain Cadman went on to give some extremely useful information on investigations which have been carried out to discover the extent of the deposits of cannel in this country. He mentioned the history of the oil-from-cannel industry, remarking that in 1865 there were no fewer than 154 retorts distilling cannel in North Staffordshire, 22 in Flintshire, and many in other counties and in Scotland. During the latter stages of the War, the utilization of cannel as a possible source of oil was again brought up for discussion. The main conclusion arrived at was that the cannel in England and Wales was not regarded as a sound commercial proposition, except as regards small quantities that could be separated cheaply and used for the enrichment of gas. It is impossible, he said, to make anything like an accurate estimate of the available quantity of cannel in any locality. Cannel is a most elusive substance.

Mr. F. B. Richards, of the Woodall-Duckham Companies,

Among those Present at the President's Luncheon



As Seen by Fred May

paid high tribute, as indeed did several other speakers in the discussion, to the close collaboration between the Fuel Research Board and the Gas Industry—a type of co-operation which is growing in importance. One of the interesting features of the Paper, said Mr. Richards, is that the tests carried out at the Granton Works have shown the great significance in vertical retort practice of the porosity of the charge. Dr. H. G. Colman referred to tests carried out at Birmingham and St. Helens in 1918 on the carbonization of cannel, and he stated that the results obtained at that time, taking into account the type of cannel treated, were in accord with the results given in the Paper by Mr. Jamieson and Dr. King. The whole crux of the matter is the availability of supply of the cannel in this country, and whether it could be mined commercially. Dr. Colman also spoke of the difficulties which he had experienced from the ash in Yorkshire cannel coke when used in a carburetted water gas plant. Mr. John Wilson suggested that the ultimate success of the carbonization of cannel would depend largely on the coke made from it, and he asked Mr. Jamieson if he thought he could successfully market a very much larger quantity of cannel coke either locally or for export and so enable him to use a higher percentage of cannel in his coal. Mr. Wilson also pointed to the far greater content of hydrogen sulphide in the gas when using cannel, a fact which might add to the problem of purification.

In the course of his remarks during the discussion, Mr. T. Carmichael said it would be interesting to see if Mr.

"It's the pink [and/or white, green, blue, coach, railway] ticket they want, Sir."

Jamieson decides to recommend his Undertaking largely to adopt the use of cannel on the strength of the findings of the investigation and in view of the good results indicated. Mr. Carmichael feels that the buying price and supply of cannel are not sufficiently stabilized to warrant such a course being adopted.

New Gas-Works at Shanghai.

The last technical item on the programme was the description of the new gas-works at Shanghai by Mr. W. J. Baker, Engineer-in-Chief and Manager to the Shanghai Gas Company, Ltd. In this Communication the Author explains that during the year 1930 the Shanghai Gas Company, realizing that its existing works was approaching the end of a useful life, decided to build a new works on a new site. The scheme finally adopted allowed for new manufacturing plant on a site 160 ft. wide and 1,425 ft. long, and a high pressure pipe line connecting the new plant to the existing gasholders, about 6½ miles distant. The site purchased was a swamp which had been reclaimed from the river in 1919. The complete plant and buildings were carried on piled foundations, the entire load on the piles being taken by the skinfriction on their surface. Details of the various foundations and buildings are given.

In view of the high cost of land and the cost and uncertainty of Chinese labour, it was decided to install mechanical coal handling plant, vertical retort plant, and mechanical coke handling and screening plant. The coal is usually purchased from Japan in consignments of 2,000 to 3,000 tons, and the coal storage was designed to accommodate 5,500 tons. Two jigging coke screens enable the coke to be graded into four sizes.

On the subject of labour, the Author remarks that the general opinion appears to be that eastern native labour is excessively cheap. Chinese labour is cheap, but the individual labourer is physically weak, and at least three Chinese are required to perform any manual work which would be done by one British labourer. For example, a machine charged bench of horizontal retorts in 20 settings of eights required 37 Chinese stokers per eight-hour shift.

The carbonizing plant consists of Woodall-Duckham upwardly heated continuous vertical retorts, capable of producing 4 million cu.ft. of gas per day, with external producers designed to use breeze fuel. The water gas plant is used only as a standby, owing to the high cost of oil.

A summary of the cost of the works is given, as also are the carbonizing results over a period of six months, together with analyses of the coals carbonized. The results obtained when diluting the steamed coal gas with producer gas in order to obtain a final gas of 440 B.Th.U. per cu.ft. are set out.

Unfortunately, Mr. Baker could not be present to introduce his Paper in person, and in the circumstances it fell to the lot of Mr. E. B. Tomlinson, of Birmingham, to do so. Mr. Tomlinson's introduction, which was most attractive and interesting, was enjoyed by all.

There was no discussion on the Paper.

Concluding Proceedings.

Mr. Lacey then announced that the Second Annual General Meeting and Third Annual Dinner of the British Gas Federation will be held at Grosvenor House, Park Lane, London, on Nov. 2, 1936; that the Research and Education Reports of The Institution for 1935-36 will be presented at the 8th Autumn Research Meeting in London on Nov. 3 and 4; and that the 74th Annual General Meeting of the Institution will be held in London on June 1, 2, 3, and 4, 1937.

Mr. J. E. Blundell, of Carlisle, proposed an omnibus vote of thanks to all who had contributed to the success of the Meeting. In doing so he paid special tribute to the work of Mr. Alexander and his staff. It was impossible, he said, to speak too highly of their work. The vote of thanks was seconded by Mr. Archibald Kellock, of Airdrie, and was carried with hearty enthusiasm.

In the course of his reply, Mr. Alexander mentioned that during the course of the Meeting he had received from two Japanese gentlemen, who were in this country for the first time, a donation to the Benevolent Fund of the Institution.

Mr. H. C. Smith explained that the next item on the Agenda was a vote of thanks and presentation of the Presidential Certificate to the retiring President, Colonel Carr. In his absence, however, he had to propose a vote of thanks to Mr. Stephen Lacey for the way in which he had conducted the meetings.

"It is," said Mr. Smith, "a most difficult thing for anyone to read an Address which someone else has written, and I am sure it added very much to the interest of the morning's meeting to hear Mr. Lacey read the Presidential Address. I ask you to accord Mr. Lacey a very hearty vote of thanks for the way he has worn the mantle of the President as though it had been made to measure instead of being taken down off the shelf, so to speak, at short notice. He has carried out the duties in a most admirable manner and we shall look forward to the meeting next year after he has had this trial run." Mr. Smith asked Mr. Lacey to accept, on behalf of Colonel Carr, the Presidential Certificate recording the fact that Colonel Carr held the office of President for the year 1935-36.

Mr. Lacey, in reply, said he was glad to shoulder the responsibility of these meetings when the President was unfortunately taken ill, and to play his part in making the meeting the success it undoubtedly had been. It had been an easy task for him because of the backing of the Council and because of the friendly indulgence of the members and the enthusiasm and efficiency of the staff. He would have the greatest pleasure in handing the Certificate to Colonel Carr at the earliest opportunity. If Colonel Carr was not able to attend next Council meeting, what he proposed to do was to make a special journey to Manchester, when he would be able to tell Colonel Carr about the meeting. He desired to express to Alderman Wardle and his colleagues their thanks for attending in spite of Colonel Carr's illness.

Alderman Wardle said they had been pleased in any way to make up for the regrettable absence of their Engineer, and they had all been very interested in the proceedings. He would convey to Colonel Carr all the sympathetic references which had been made so generously.

Au Revoir But Not Good-Bye

W. E. PRICE—

The Man and the Hon. Secretary

A MEMOIR

by

"One of the Nephews"

"I thank you, gentlemen. I will say *au revoir* but not good-bye."

With these words William Edward Price, retiring after 23 years' tenure of the Honorary Secretaryship of The Institution of Gas Engineers, concluded his thanks at the Meeting to his many friends for their testimonial to him. No one who was present will ever forget the spontaneous applause, loud and prolonged, which followed, for it spoke, with an eloquence which no words could convey, of his popularity, and of the sense of relief and consolation at the thought that, though he was relinquishing his position as Honorary Secretary, they were not to lose him as their fellow member and friend at future meetings of the Institution.

There is a parallel between the relationship of highly placed officials of the Civil Service with Cabinet Ministers, and of the Honorary Secretary of the Institution with the officiating President. In one important respect, however, so far as our friend is concerned, the parallel of the Civil Servant does not exist. With the latter the chilling environment of his surroundings inevitably tends to introduce something of the bureaucrat, at the expense of the human element, into his official character, however charming a man he may be in his private capacity. On the other hand, it is to the credit alike of the Institution and of W. E. Price that, at the end of his long term of service, his innate geniality and courtesy have increased rather than diminished in all his dealings, official and unofficial alike.

His long connection with the Gas Industry enabled him to draw upon a varied experience which he was always only too willing to place at the disposal of his fellow members, and when difficult or complicated problems were presented to Council his ripe wisdom generally enabled him to suggest a solution which would commend itself to those present. He never spoke for the sake of speaking, and he never obtruded himself; he preferred to remain in the background, a wise and genial figure, until the moment arrived when he could render assistance by giving his opinion or advice.

The many Past-Presidents whom he has so kindly and tactfully piloted through the shoals and narrows of their Presidential years owe him a deep debt of gratitude. It has become almost a sacred tradition that President and Past-Presidents are permitted to address him as "Uncle"—a privilege which is highly valued. In this capacity it is probable that he has established a record, for surely there could be no one else avuncular to such a number of grateful and admiring nephews!

W. E. Price has always been jealous of the dignity of the Institution and its members, and he has never failed to resist in the firmest possible manner anything which would impair that dignity or lower the status of the members. His term of office covers one of the most eventful and fruitful periods in the history of the Gas Industry, and he participated to the full in almost every activity of the Institution and the Industry during that period. He has witnessed the phenomenal expansion of research work and the patient building up of the Education Scheme. He took a leading part in the work which culminated in the granting of the Charter to the Institution, and he represented it well and faithfully upon many of the National Bodies connected with the Industry. Time and space would not permit of anything like a full record of his achievements, but in justice to him it is necessary that we should be reminded of them, for as he performed every task which came his way in an unostentatious self-effacing manner, the true extent of his services might be in danger of being overlooked or (*infandum!*) forgotten.

A modest but outspoken man when occasion demands it, he has never sought praise or advertisement for himself or his services, and it is typical of his attitude of mind that he has asked that the testimonial which he has so thoroughly merited should be devoted to the benefit of those of his fellows who have met with misfortune or infirmity.

Some reference must also be made to the wonderful sense of humour which has contributed so much to the success with which he has faced delicate and critical situations during the whole of his term of office. This quality, as will be readily appreciated by his closer friends, is notoriously valuable to its possessor, and he certainly has it in full measure. In the hearts of all his colleagues in the Gas Industry, he has won for himself a place which no one can take from him.

With all his work for the Institution, "Uncle" Price was for ever rendering invaluable services to the Industry in other spheres, and no appreciation would be complete without some reference to these. After fifty-seven years' service with the Hampton Court Gas Company, he retired from the position of Managing Director at the end of 1934. It was in 1876 that he joined the Company as Junior Clerk. He was articled to his father, Mr. E. Price, who had built the Works in 1852. He was appointed Engineer and Manager in 1887, and was elected Managing Director in 1922. As some indication of the progress of the Company under his supervision, it might be pointed out that the make of gas in 1887 was 87 million cu.ft., and when he retired in 1934 the output was 500 million cu.ft. During the same period the Works were entirely rebuilt and enlarged under his direction.

He was elected a Member of the Southern Association of Gas Engineers and Managers, of which his father was a Foundation Member, as long ago as 1879, and he is now the oldest Member of the Association. He held the office of Hon. Secretary from 1910 to 1913, having been President in 1902. He was instrumental with others in the foundation of the British Commercial Gas Association in 1911, and became Hon. Secretary of the National Gas Council on its foundation in 1916, an office which he still holds. He was elected Hon. Secretary of The Institution of Gas Engineers at the Jubilee Meeting in 1913, when Sir Corbet Woodall was in the Chair, and so has seen twenty-two Presidents through their year of office, beginning with Mr. Edward Allen at Liverpool a few months before the outbreak of war. In addition to these many activities he is also an Associate Member of the Institution of Civil Engineers.

In November, 1887, he obtained a patent for his prepayment meter. This meter, the automatic arrangement of which was of the simplest description, was specially designed to bring on to the books of gas undertakings a class of consumer which had not before that time figured there owing to the existence then of the custom of demanding a deposit or other security before gas was laid on.

During the anxious days of the Great War when, in his

capacity as Hon. Secretary of The Institution of Gas Engineers he was engaged in a running struggle with the serious problems of coal supply and prices, shortage of labour, and other pressing subjects, he could always find time to care for the welfare of all but himself. The men who had left Hampton Court Gas-Works for the Front were well aware of his constant thoughtfulness. A year or two ago the affection which his men had for him was manifested in a very striking manner when they had, entirely on their own volition, collected enough weekly pennies to institute a technical library at the Hampton Court Works to commemorate the esteem in which they held their retired Chief. The writer has been privileged to see a letter written in this connection by one of the employees, from which the following excerpts, in their own way, are the kind of tribute which any man might envy. "I dare say you would like to know," the letter ran, "why I take such an interest in the scheme. Well, it is like this. Have you ever been in the front-line trenches, wet, cold, muddy, and hungry, and had a damned hot time of it when you were there? Well I have, and on coming out the first thing I received was a parcel of comforts from Mr. and Mrs. W. E. Price, with some clean socks, chocolate, and cake in it. Try to think what a joy that was! Can one ever forget it? Only an employee away from the Company—and yet not forgotten. . . . I regard him as a model employer. He would not spend a penny of the Company's money where a halfpenny would do. Always firm, but always just and fair in all his dealings, never forgetting the men under him, and whenever a position became vacant he would always fill it from his own ranks. When he retired we all lost—what shall we say?—a father of a large family, a man whose position, from our point of view, will be hard to fill."

* * * * *

In compiling this short memoir, the writer has suffered under one grave handicap. Those who know W. E. Price as well as he does will appreciate what would have been the result of approaching him, whether with a view to gathering "copy" or even to checking up as to facts and dates. If, therefore, as a record of wonderful service happily rendered it has its imperfections, it is at least a sincere tribute written from the heart and not the copy book. Let it end, as it began, with the happy sentiment introduced by W. E. Price himself—"*au revoir* and not good-bye"—which will be echoed throughout the Industry.

New Members of the Institution

During the Meeting the following were elected to membership:

To Honorary Membership.

The President (*ex-officio*) of the International Gas Union and the Presidents (*ex-officio*) of the Gas Associations of Australia, Austria, Belgium, Canada, Czechoslovakia, Denmark, France, Germany, Holland, Hungary, Italy, Japan, New Zealand, Norway, Poland, Spain, Sweden, Switzerland, United States of America, and Yugoslavia.

Goodenough, Sir Francis, Knt., C.B.E., Executive Chairman, British Commercial Gas Association.

To Membership.

Clark, George Thomas, Superintending Engineer, West's Gas Improvement Company, Ltd., Manchester.

Crowther, Reuben, Engineer and General Manager, Ramsbotham Gas Company.

Gooch, William Spencer, Divisional Superintendent of Mains, Brentford Station, Gas Light and Coke Company.

To Associate Membership.

Brown, Hector Houston, Technical Assistant, Dunfermline Corporation Gas Department.

Bury, Thomas Rothwell, Assistant Engineer and Manager, Haslingden Union Gas Company.

Castle, Jack, Engineering Assistant, Brighouse Corporation Gas Department.

Chorley, Albert Edward, Works Draughtsman, Bow Common Station, Gas Light and Coke Company.

Clapham, Thomas William, Technical Assistant, Bristol Gas Company.

Curry, Herbert William, Chief Chemist and Technical Assistant, Blackpool Corporation Gas Department.

Davison, Henry Gordon, Technical Assistant, Chester United Gas Company.

Elliott, Alan William, Assistant Engineer and Manager, Elland-cum-Greetland Gas Company.

Gamper, Alfred John Louis, B.Sc., Shift Superintendent Engineer, Wandsworth and District Gas Company.

Harrison, Harold Campbell, B.Sc., Assistant Superintendent, Belfast Corporation Gas Department.

Mawson, Arthur, Technical Assistant and Chemist, Otley Gas Company.

Rees, Darrell Wolfe, Technical Assistant, Neath Corporation Gas Department.

Seabrook, John Anthony, Assistant Manager, Leighton Buzzard Gas Company.

Shelley, William John, Assistant Engineer and Manager, Hinckley Urban District Council Gas Department.

Thomas, Gwynne Evans, Technical Assistant, Neath Corporation Gas Department.

Thompson, George Alan, B.Sc., Assistant Engineer, Beckton Station, Gas Light and Coke Company.

Tidball, Frederick Nelson, Engineering Assistant and Draughtsman, Coventry Corporation Gas Department.

Townsend, John Westcott, B.Sc., Assistant Engineer, Beckton Station, Gas Light and Coke Company.

Turner, George, Technical Assistant, Liverpool Gas Company.

Webber, Jack Michael Edwin William, Engineering Assistant, Croydon Gas Company.

Wolfe, Thomas Arthur, District Superintendent, Tottenham and District Gas Company.

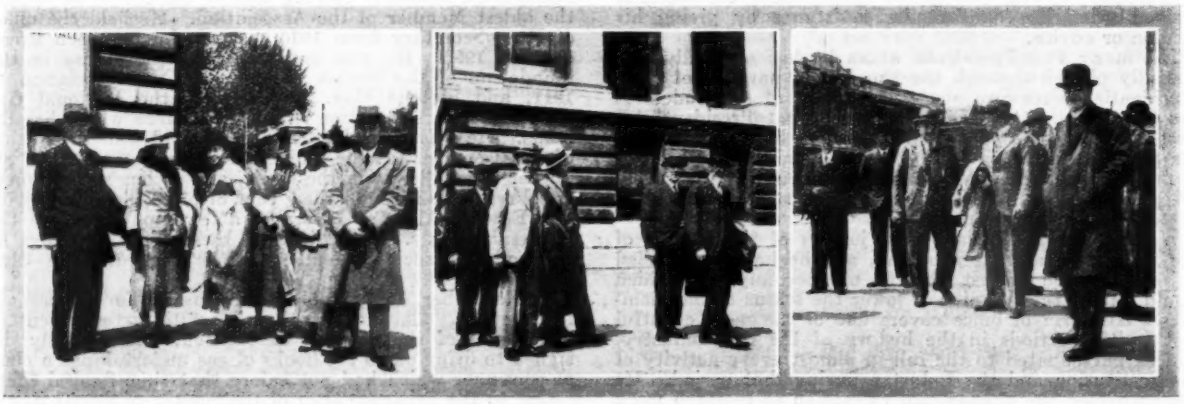
To Associateship.

Balmford, Norman Ratcliffe, B.Sc., Technical Assistant, Fletcher, Russell & Co., Ltd., Warrington.

Cooper, Frederick Thomas, Technical Salesman, Workington Corporation Gas Department.

Ellerd-Styles, William, Managing Director, Ellerstyle Engineering Company, Ltd., London, N. 1.

Woolidge, Ronald Arthur, Technical Assistant, South Suburban Gas Company.



Outside the Guildhall, Portsmouth, on Friday, May 29.

PRESIDENTIAL ADDRESS

OF

Colonel W. MONCRIEFF CARR, O.B.E., T.D.

(Engineer and General Manager of the Stretford and District Gas Board.)

Presented on the opening day of the 73rd Annual Meeting of The Institution of Gas Engineers, in London, Tuesday, May 26, 1936.

I should like, in the first place, to thank you for the honour you conferred upon me in electing me your President a year ago, and in doing so I am conscious that I have done much less in the conduct of the work of the Institution than I had hoped to be able to do when I accepted this office.

The year during which I have been privileged to act as your President has been an eventful one; as a nation, we suffered the loss of our late beloved Sovereign, George V, and we are proud to serve His Gracious Majesty, King Edward VIII, who, as the Prince of Wales, honoured this Institution by graciously consenting to be an Honorary Member.

It is six years since the office of President was filled by a Municipal official, and I should like to take this opportunity of paying tribute to the Chairman and Members of the Stretford and District Gas Board for their generosity in permitting me to accept office as your President, and for the encouragement they have given to me personally.

I am pleased to say, thanks to the loyal support and efforts of my staff, the year has been a record one in the history of the Stretford Gas Undertaking, the sales of gas being increased by no less than 23·92 per cent.

The Gas Engineer; Change in Aspect of His Work.

The work and training of the Gas Engineer is perhaps the most important concern of our Institution, and the Gas Education Scheme continues to attract an increasing number of students.

It is pleasing to note there is an increase in the number of candidates taking the examinations in Gas Supply. It is somewhat difficult to understand, however, why no candidates have come forward for the Diploma in Gas Engineering and Supply; it would appear that this is due to failure to appreciate the ever-increasing importance of the distribution and technical sales side of our Industry.

The successful Manager of a Gas Undertaking to-day must of necessity spend at least 80 per cent. of his time in the administration of his Undertaking, more particularly that administration devoted to business development; and to-day the Gas and other industries are facing the question of how capable administrators are to be obtained.

I believe the technician is well equipped for management, and an Industry such as ours must rely so much on science that the technician is most frequently found in an administrative position. It does not, however, follow that the ability of a Gas Engineer as such renders him suitable for commercial administration. Some Engineers by their purely technological view are unfitted for management, but I believe, nevertheless, that the tendency of our Industry will be to continue to find its administrators from the ranks of technicians with the broadest theoretical and practical training who are well versed in business administration.

In this connection, I would refer to the importance of the technical salesman who, I believe, should be included within the category of a Gas Engineer. His recruitment and training are of the utmost importance to the Industry. There is a school of thought which inclines to the view that the domestic Gas Salesman need not be a technician. My experience, however, has been that to obtain the best results the acquisition of technical knowledge should form the basis of the training of all Gas Salesmen, as by this means only is it possible for him to appreciate and believe in the gas which he has to sell.

The successful salesman must believe wholeheartedly in his commodity and have the imagination to appreciate the possibilities of its service to the public.

The scope of the service to be rendered by our Industry in this country knows no bounds, and I know from experience of recent years how development can be hastened by wise planning and looking ahead. I hope, therefore, that we shall spare no effort in our Institution to encourage the advancement of the Gas Engineer as a Technical Gas Salesman.

Many Past-Presidents and speakers at Institution meetings have voiced the old adage that " the Profits of the Gas Undertaking are made in the Retort House "; this is a truism, safeguarded, however, by the great and lasting improvement in the efficiency of modern Carbonizing Plant. I would venture to suggest that it would be more correct to-day to state that the profit on the modern Gas Undertaking is made in its Service and Sales Organization.

Liaison with the Universities.

As an Institution, we value the liaison with the University of Leeds, which has been so intimately concerned with the research work of the Institution. I would, however, like to refer to the post graduate training of Students in Gas Engineering, and to take this opportunity of pointing out that the Graduate Course is an educational Course, and it should not be thought that it can supplant the practical training of a Gas Engineer; a Graduate, on leaving the University, if he desires to qualify for the higher technical and administrative positions, must be prepared to continue his practical and administrative training for at least two or three years. He should not be led to believe that, on completion of his Graduate Course, he is fitted for a responsible position without practical training.

In making this observation, I am assuming that the staff learner who passes straight into the Industry from school requires from 5 to 6 years' training, and this period of practical and administrative training can be considerably shortened in the case of the staff learner who comes in as a Graduate.

The University of Leeds, in addition to the normal Graduate and post-Graduate Courses in Gas Engineering, provides special Evening Classes for students in Gas Engineering, and has gone to considerable trouble in obtaining capable and eminent lecturers for these classes. I have been asked to refer to the poor attendance at these classes, and it is hoped that, in future years, all those Gas Undertakings within reasonable distance of Leeds will provide facilities for, and encourage, members of their staff to become students.

Your Council is desirous of maintaining the close liaison with the Universities; at the same time, it considers that it is desirable, in the best interests of the Institution and of the Industry, that Graduates who have taken an approved degree at other Universities or Colleges should be eligible for admission as Associate Members under our By-Laws, and at this 73rd Annual General Meeting special time is being set aside for the consideration of the proposals of your Council for the Amendment of the By-Laws.

Research.

I think it may be fairly claimed that the technical reorganization as applied to the research work of the Institution, which has now been in operation for more than a year, has been justified by results achieved.

The Reports submitted at the 7th Autumn Research Meeting were of a high standard. It is to be regretted, however, that there was a marked lack of speakers to contribute to the discussion on many of the Reports, notwithstanding their vital importance to the Industry.

I should like to impress upon Members responsible for Undertakings the importance of arranging for as many as possible of their technicians to attend the Autumn Research Meetings of the Institution with a view to contributing to the discussion on the research and specialized technical reports.

The time and expense of such attendances will undoubtedly prove most profitable.

The programme of work of the Joint Research Committee during the past year includes—

(1) The completion of the laboratory investigation of the corrosion of metals by the combustion products of gas.

(2) A laboratory investigation of the fundamental reactions involved in the complete gasification of coal and coke under pressure, using oxygen and steam.

(3) A comprehensive survey of literature relating to criteria of combustion characteristics of gas, preliminary to a study of gas burners most suitable for dealing with gases varying in chemical and physical constitution, as a step towards the general adoption of burners of fixed gas and air supply.

This latter investigation is an extension of previous research by the Institution on the relation between gas quality and efficiency in use, and on aeration of burners. The Committee, in recommending to the Research Executive Committee that this work should be put in hand, felt that the introduction of burners of fixed gas and air supply would greatly simplify maintenance, and so assist in the popularization of gas.

I should also like to refer to one or two of the new discoveries, processes and technical developments which are being reviewed and watched by the Research Executive Committee:

(*a*) The synthesis of motor spirit and lubricants from gases containing carbon monoxide and hydrogen, and, more particularly, from Water Gas.

The importance of this problem and its bearing on our Industry will be obvious to all.

(*b*) The removal of carbon monoxide from town gas with the object of rendering the gas non-toxic, and the effect of such removal on the properties and performance of the gas.

The German process, which has been the subject of numerous articles in the Press, is being carefully watched by the Research Executive Committee. It has also come under the review of the Council of the International Gas Union, upon which Mr. Charles Valon Bennett is your representative. The general consensus of opinion appears to be that it is not at present practicable, under normal manufacturing conditions, to render gas completely non-toxic, and that even were it so, there are reasons which render such practice undesirable.

(*c*) The mechanism and prevention of the formation and deposition of gum in gas distribution systems.

This problem is being actively investigated by the Gas Light and Coke Company, who are ever ready and willing to place the results of their research investigations at the disposal of the Industry.

There are many other trends of technical development, in addition to those mentioned, which have been reviewed by the Technical Assistant Secretary and are being carefully watched by the Research Executive Committee, although it has not been found possible to include, in the immediate programme of work, any practical investigations in connection with them.

It would appear to be necessary for us seriously to consider ways and means of increasing our expenditure on research and practical investigations in connection with the many problems at present before us. At the present time, only 10 per cent. of the total monies subscribed to our National Bodies is expended on research and education, and although I do not think we should cut down our expenditure in connection with work which is carried out by the British Commercial Gas Association or the administrative and advisory work carried out by the National Gas Council, I think we cannot afford to restrict expenditure on research and practical investigations vital to the future welfare of our Industry.

I am not unmindful of the excellent research work and practical investigations carried out by many of our large Undertakings, and during the course of this Meeting we are to receive a Paper on "Gas Safety Precautions" by Mr. C. A. Masterman, Chief Technical Officer at Watson House, based upon his recent investigations made for the Gas Light and Coke Company.

Before leaving the subject of research and practical investigations I would refer to the assistance which our Industry has received from the work of H.M. Fuel Research Station, and in the course of this Meeting we are to receive a Paper by Mr. James Jamieson, the Engineer and Manager of the Edinburgh Corporation Gas Department, and Dr. J. G. King, the Chief Chemist, H.M. Fuel Research Station, on "Products obtained by the Carbonization of Scottish Cannel in Continuous Vertical Retorts."

Coal Selling Scheme.

We find ourselves faced to-day with what is, perhaps, the most serious problem that has arisen in the history of our Industry. Under Part 1 of the Coal Mines Act of 1930, there is being set up a Central Coal Council and District Executive Coal Boards consisting solely of Colliery Owners or their representatives, with the object of controlling the production of coal and increasing prices.

The first district selling scheme was put into operation in Lancashire and Cheshire in July, 1935.

Mr. John Wilkinson, in his Presidential Address in 1927, stated that "the Gas Industry should resist any attempt to force the dictum that as gas has so largely displaced coal for domestic purposes the price of gas coal must be increased proportionately to the loss sustained by the Coal Industry in consequence of the reduced trade for house coal." He pointed out that the greatest loss to the colliery owners was the considerable tonnage of so-called slack sold to industry, and for steam raising, at prices much below the average price on a calorific value basis of the coal sold to the Gas Industry.

The Coal Industry, with the backing of H.M. Government, are placed in a position of carrying out their avowed intention of doing that which was foreshadowed by Mr. Wilkinson.

Another most serious aspect of the situation that exists under the Lancashire and Cheshire Scheme, and will exist generally throughout the country after the 30th June next when the District Coal Schemes, which have been approved by the Mines Department of the Board of Trade, come into operation, is that Gas Undertakings will be denied the right of selection of coal most suited to their plant and to the production of a coke most suitable to the requirements of the coke sales business which they have built up.

The Lancashire and Cheshire Scheme, which is more or less the model of all the proposed District Selling Schemes, provides that the Executive Board controlling the Scheme may, at its discretion in distributing amongst the owners any allocation of output of coal or any class of coal, withhold such percentage of the allocation as it may decide for the whole or any part of the period of allocation. In effect, the selection of coals which we are to use is transferred to the coal seller who has no knowledge of our particular requirements, and already there are instances of Gas Undertakings who have been requested, and doubtless will later be forced, to take coal which is less suitable to their requirements than that for which they have contracted.

The setting up of the District Coal Sales Committees, co-ordinated nationally under the provisions of the Coal Mines Act of 1930, constitutes what I believe to be the greatest and most dangerous monopoly this country, or, in fact, the world, has ever seen. In the past, whenever monopolistic powers have been given for the supply of public necessities, such powers have been subject to a large measure of Government control for the protection of the consumer. The only appeal open to the coal user is through the medium of a District Committee of Investigation, which is by no means an impartial judicial Committee in that each includes, in its membership of five, a representative of the colliery owners and a representative of the miners.

H.M. Government has sponsored the formation of Coal Sales Schemes under which the colliery owners are enabled to restrict and regulate outputs and to enforce any prices which they may think fit to impose, discriminating as they may desire between different classes of user. The colliery owner, unfortunately, and in my opinion quite wrongly, looks upon the Gas Industry as a competitor; he appears to be labouring under the illusion that, if he establishes high prices for supplies to Public Utilities, modern progress will be retarded and the public will be driven once again to the extended use of raw coal, increasing thereby the dirt and drudgery of the home and, what is still more serious, perpetuating the pollution of the atmosphere.

I firmly believe, however, that the public of this country—who are quite rightly in sympathy with the coal miner's demand for fair play and a reasonable living wage—will insist that the Government, having taken a hand in the setting up of a great monopoly, must set up machinery to ensure that such monopoly is not in any way exploited, and that the progress made by our Industry in providing greater amenities in the home, better and improved working conditions in the factories, and a cleaner atmosphere is not, in any way, impeded or restricted.

Coke.

The production of the best quality of coke and its marketing becomes of increased importance in view of higher prices that will undoubtedly have to be paid for coal in the future.

The development of the "domestic" coke fire with gas burner ignition has opened up a new field which is being rapidly developed by all progressive Gas Undertakings. The quality of coke is, however, of paramount importance. Provided it is made from clean coal of suitable quality, carefully cooled and quenched, and produced to a uniform standard of quality, there is no better smokeless fuel for domestic purposes.

The improvement in the Iron and Steel trade has considerably relieved the competition from Furnace Coke in

the domestic coke market during the past year. It is, therefore, a convenient opportunity to endeavour to establish a central coke organization to effect stabilization of prices and to secure rational distribution.

The advantages of co-ordination that have been brought about by the London and Counties' Coke Association, which were so well described at the last Annual General Meeting in Mr. W. L. Boon's Paper, "The Preparation, Marketing and Utilization of Coke", for which he was awarded the H. E. Jones London Medal, point the way to the great possibilities of co-ordinated national policy. Serious attempts are being made in other areas throughout the country to set up Sales Associations in conjunction with Coke Oven and other fuel interests; it is to be hoped that these District Associations will soon be established, and that it will be found possible to co-ordinate them through a national organization, which would undoubtedly result in expansion of markets for both the gas and coking interests, in the better distribution and balancing of stocks, and the production, as far as possible, of uniform, graded qualities to the advantage of the consumer.

It is essential that we should appreciate the importance of producing and preparing coke of the best quality, even in the smallest Undertakings, and with this end in view it is essential, in the interests of our Industry and the public it serves, that we should be free to select the coals most suited for our particular requirements, and to produce a coke in every way suitable for the requirements of our coke customers.

Tar.

The Co-operative Tar Schemes, which now deal with the greater part of the Tar produced in Gas Undertakings, have proved of undoubted advantage to our Industry. In spite of considerable variation in the values of pitch and creosote, due to variation in trade conditions and money values on the Continent and in America, and notwithstanding severe competition in the Road Tar market at home, prices have been stabilized to an extent that would not have been possible had it not been for this co-operative method of trading; this result has been achieved in the main by the careful marketing of products and the avoidance of flooding over-stocked markets.

The co-operation between producer and distiller has enabled substantial economies to be effected in transport and manufacturing costs, particularly in the working up of refined products in a smaller number of Works conveniently disposed for the purpose, in marketing and sales organization, and in the elimination of inefficient or redundant Tar Works.

The Co-operative Schemes have the great advantage of retaining the control and interest in the working of the tar in the hands of the producer, with the advice and assistance of the Distillers whose sole business is the technique of tar distillation and the sale of the products in the markets of the world.

The British Road Tar Association continues to carry out excellent propaganda work for Road Tar. It is unfortunate, however, that we are obliged to continue to meet the competition—for road purposes—of bitumen which is a product of foreign origin, but which claims to entitle itself "British" in so far as it is a waste product from imported oil which is refined in this country, and it is to be regretted that we still find this product treated on the same basis as our own in the matter of "grants in aid" from the Road Fund to Local Authorities. Special representations are being made by the British Road Tar Association to the Ministry of Transport, which it is hoped will result in the redress of this injustice.

The hydrogenation of creosote, and its use as a mixing medium in the hydrogenation of coal, has resulted in a more stabilized market for this product.

Benzole.

The practice of scrubbing gas for the recovery of benzole is extending rapidly, and is likely to do so as long as the price remains fairly constant. The process has advantages beyond the recovery of the valuable by-product, benzole, in that the oil washing removes from 40 to 45 per cent. of the total sulphur compounds in the gas, and the total sulphur compounds in the washed gas can usually be reduced to 15 grains per 100 cubic feet. It will be remembered that Hollings and Hay (see "The Recovery of Benzole by Active Carbon," Chemistry and Industry, 1934, pages 143 to 155) have shown that the active carbon process of benzole recovery over a period of six months' continuous working at the Beckton Plant of the Gas Light and Coke Company effected a reduction in the sulphur compounds of the gas from 30·5 grains per 100 cubic feet at the inlet to 6·1 grains at the outlet.

Manufacturing Plant.

With the improvement in trade conditions and general increase in gas sales, many Undertakings are putting in hand overdue reconstructions and extensions of plant.

In carbonizing plants in the larger installations, Intermittent Vertical Chambers appear to find increasing favour. The most efficient carbonizing plant is not necessarily of the same type in all instances; it is largely a matter of local conditions as to the supply and demand for gas and coke, and particularly the quality of coke.

I have, over the last 12 years, achieved a comparatively low cost ratio utilizing large Horizontal Retorts in settings of ten with producers built in, but not communicating directly to the combustion chambers. By this means, the carry forward of dust in the heating gases is largely prevented, and it is interesting to note that the average working life of three of these settings in 99 per cent. silica, to be renewed this year, has been 2,951 days. Three other settings of similar type, but with the producer communicating direct through nostrils in the producer arch to the combustion chamber, and worked under similar conditions, had an average life of 1,807 working days.

I mention this as illustrative of the importance of firing with dust-free gases.

We are to receive in the course of the Meeting a communication contributed by Mr. W. J. Baker describing the construction of the new Gas Works at Shanghai and some of the many interesting engineering problems arising in connection with this work.

I regret that Mr. Baker has not found it possible to attend in person to present his most interesting communication.

Development of Gas Sales.

The development of gas sales, and the finding of ways and means to increase the consumption per consumer, is to-day the problem which occupies first place in the minds of all progressive gas administrators.

I should like to refer to the "Memorandum on Methods of Charge" issued to all Members of the National Bodies by the National Gas Council with the approval of the Joint Co-ordinating Committee, and also to the "Memorandum on Tariffs as a Means of Gas Sales Development" issued by the Joint Co-ordinating Committee—of which Committee I am privileged to be a Member—arising out of the letter and memorandum submitted by Mr. J. T. Haynes in June, 1934. The former deals with methods of improving upon the flat rate, describes the advantages of the block and two-part rates, and points out that, with the additional latitude given by the Gas Undertakings Act of 1934, considerable additional sales can be effected at rates materially below those now being charged.

In the latter Memorandum the Committee stresses the urgent necessity for every Undertaking to frame for itself a competitive form of tariff, and points out that the financial risk involved in adhering to flat rate methods of charge is greater than that involved in the introduction of attractive tariffs. Appreciating that the further development of sales for domestic purposes must be chiefly at the expense of solid fuel, it was recommended that the framing of tariffs should be considered from this angle, that is, to give a commodity price at which gas would be competitive with solid fuel. Time will not permit of the description of these important Memoranda in detail, which I trust have been carefully studied and considered by every gas administrator in this room. We are to have an opportunity of hearing more on this subject in the communication to be submitted by Mr. J. T. Haynes on "The Two-part Tariff as an Aid to Gas Sales."

Before leaving the subject, may I be permitted to say that the rapid development of industrial sales in the Undertaking for which I am responsible dates, in the main, from the introduction of the two-part industrial tariffs eight years ago. The majority of our industrial contracts provide for a standing charge and commodity charge, or, alternatively, a block rate, both of which protect the gas supplier in the case of variation in the load factor or demand.

In October, 1934, an optional two-part tariff for domestic consumers, both by ordinary and prepayment meter, was introduced and is being rapidly taken up. At the end of the financial year, 31st March, 1936, the tariff had been adopted by 2,055 consumers of gas by ordinary meter and by 3,320 consumers of gas by prepayment meter, a total of 5,375, approximately. 20 per cent. of the total number of consumers. It should be borne in mind, however, that the introduction of a tariff will not, in itself, produce additional business unless it is backed up by the best possible sales and service organization. This is equally true of both domestic and industrial supplies. In this connection, we are to receive a communication by Mr. T. H. Pardoe on "Heating Problems Arising in Industrial Gas Sales."

Liaison with Other Associations.

The importance of close liaison between our Institution, representing as it does a national industry, and other Institutions and Associations cannot be over-emphasized. We are, as a body, singularly conservative, and I suggest that this attitude operates to our detriment in that the importance of our work is not more widely known and appreciated.

I would refer to the Institution Session held at the Public Works, Roads, and Transport Congress and Exhibition in November, 1935, when two excellent Papers were presented to a somewhat sparsely attended Meeting. Members could help very much by supporting this Session themselves and by inviting any Members of Local Authorities or Officials whom they knew to be attending the Congress to participate in the Meeting.

I look forward to a closer liaison, not only with such bodies as the Association of Public Lighting Engineers, the Illuminating Engineering Society, the Institute of Fuel, the Institution of Chemical Engineers, &c., but also with our large sister Institutions, the Civil and Mechanical Engineers, with whom increased interchange of communications is most desirable.

Holding Companies.

The advantages and disadvantages of Holding Companies have been the subject of much discussion and, so far as the Gas Industry is concerned, it appears that their efficacy will largely depend upon their management and method of operation.

The savings that can be effected by central purchasing are limited unless combined with some degree of standardization.

It is desirable that the Holding Company should provide for its subsidiaries the best commercial and technical brains to assist in the development of sales.

They can also greatly assist their subsidiaries by advice and help in the introduction of sales promotional tariffs, by the co-ordination of accountancy, by the provision of propaganda and publicity service, by the provision of cheap finance for hire purchase, &c., and by procuring the best technical advice which might normally be considered beyond the expense of the small unit.

The advantages of the acquisition of a number of Undertakings for geographical grouping are obvious, and substantial economies can be effected by combining some Works service, and many distribution services, where Undertakings are conveniently geographically situated. A further advantage lies in the linking up of adjacent Undertakings, which is frequently prevented to-day by reason of purely parochial interests.

I believe in the matter of central purchasing that a Holding Company should charge all materials and appliances to its subsidiaries at the net cost, and that it should, for the purpose of financing its central administration, make a charge upon its constituent Companies based upon their output of gas, thus ensuring that the benefits and costs are shared equally by all; moreover, when the accounts of a subsidiary Company are the subject of review, for the purpose of gas charges, the cost of the Central Administration can be seen in its relationship to services rendered.

It is desirable that the Holding Company should maintain the initiative and the interest of the Manager of the subsidiary, who must at all times be held responsible for his own Undertaking; he, on his part, however, should not lose sight of the necessity for the "team spirit", appreciating that all are working for a common object, that is, the supply of more and cheaper gas to the public.

In the face of increasing competition, it is desirable that the smallest unit should, if possible, be made as strong as the largest, and this can be effected by Holding Companies and Amalgamations or both, as a Holding Company securing the majority interest in two Companies can at once proceed with their amalgamation.

In our proceedings to-day we are to receive a communication by Mr. Francis C. Briggs, dealing with "The Dudley Gas Amalgamation."

Science Museum.

It has been a matter of some concern to many of us that whilst other industries are well represented in our national Science Museum, South Kensington, there is no gas exhibit commensurate with the importance of our Industry.

The Science Museum is a national institution much used by educational authorities and visited by millions of people from all parts of the country. I, your President, with Mr. D. M. Henshaw, Chairman of the Society of British Gas Industries, have met Colonel E. B. Macintosh, the Director of the Museum, who has agreed to provide the space if our Industry will provide the exhibit. The matter is now before the Joint Co-ordinating Committee, and I anticipate that we shall, in due course, receive an appeal to provide this most desirable exhibit, which appeal will, I trust, be supported by everyone.

Retirement of Mr. W. E. Price.

You have learnt, I know, with regret, of the resignation of Mr. W. E. Price from the Honorary Secretaryship of our Institution, which office he has filled so ably for the past 22 years. He has been a sound counsellor and friend to many occupants of this Presidential Chair, and he has rendered outstanding service to our Institution, to which he has always been wholeheartedly devoted.

Your Council, as a tribute to his service and the esteem in which he is held by all Members, has inaugurated the W. E. Price Presentation Fund, the proceeds of which will, at the express desire of Mr. Price, be devoted to our Benevolent Fund.

The prosperity of our country is being built up largely on the wealth of its coalfields, and it cannot be questioned that the carbonization of coal provides a solution of the problem of how best to use our nation's wealth. I would, therefore, repeat my conviction that, provided we are assiduous in the introduction of Sales Promotional Tariffs, and in intensive co-ordinated sales effort by setting up the best service that we can devise, Gas must inevitably supply the industrial and domestic heating requirements of the nation.

Vote of Thanks to the President

Mr. E. CROWTHER (Salford): I am privileged to propose a vote of thanks to our President for the Address we have just heard, and I do so with the greatest sincerity. Our thanks are all the more due to Colonel Carr in that, as I understand, he prepared the Address while he was actually confined to his bed, being determined that, though we may be deprived of his presence at this meeting, we should at least have the benefit of his message. The meeting has already expressed sympathy with him in the most unfortunate circumstances which have arisen; but we have the satisfaction of believing, without running any risk of undue easy optimism, that there is every prospect of his early return to that complete activity which he normally enjoys, and from which the Industry has benefited so largely.

Coming, as it does, at the end of a year of office, a President's Address can hardly be regarded as an isolated piece of work, but rather as the signature to the record of the year's work. The signature is characteristic of the man. I see three foundation-stones in the Address. There is first a whole-hearted belief in the merits of the Industry which our President serves; secondly, a determination to urge it to take every means of developing its possibilities to their very farthest limit; and thirdly (and here, I think, we see something of the tradition of his family), a challenge to everything which may stand in the way of the Industry's fullest development. That spirit animates all his work and is, of course, reflected in those results achieved at Stretford, to which he refers briefly and modestly, but which are so admirable and which afford such an example to all of us in the Industry. Here, too, I should like to take the opportunity, as one of his neighbours, to say how much we in Lancashire appreciate those qualities of leadership and helpfulness which he always shows and which, during the last year perhaps in increasing measure, we have shared with the Industry as a whole. We shall all benefit from this Address, and we look forward to many more years of service to the Industry by our President, in whatever capacity that service may be rendered.

Mr. S. E. WHITEHEAD (Southampton): I have great pleasure in seconding the resolution so ably proposed by Mr. Crowther. As I am not a neighbour of Colonel Carr I may express the thanks of the Southern members for his very excellent Address and express to him also our good wishes. I am glad it has been placed on record that we share Colonel Carr's very great disappointment in regard to the bad luck which has prevented him from delivering the Address personally, for obviously he has devoted a great deal of thought to its preparation, and it will be of great assistance to us in the future. I think we might also place on record our thanks to Mr. Lacey for his very able rendering of the President's production.

The vote of thanks was enthusiastically accorded.

DISCUSSIONS ON THE PAPERS

Our report of the Papers appeared in our First Institution Number, and the following is a full report of the Discussions which took place upon them. Papers and Discussions are summarized on earlier pages of this issue in the running account which gives the consecutive story of the whole Meeting.

(Communication No. 131)

The Dudley Gas Amalgamation

by

FRANCIS C. BRIGGS

(Engineer and Managing Director, Dudley, Brierley Hill, and District Gas Company)

The CHAIRMAN (Mr. Stephen Lacey): Mr. Briggs has presented us with a very valuable Paper, which is certainly deserving of a good discussion. It is a model Paper of its kind; every essential factor in the problem to be solved is given, the reasons for the decisions made and the actions taken are clearly stated, and the whole Paper is a striking example of the fruitful reaction between administrative and engineering skill in a commendably concise form. On behalf of all present, I thank you very much, Mr. Briggs.

Mr. JOHN TERRACE: From a close association with Mr. Briggs in Institution work over a number of years one naturally anticipates a clear and concise statement of the pros and cons for the amalgamation of his Company with its neighbour, Brierley Hill, in the Paper now under discussion, and one is not disappointed. The views and information given will appeal to two different classes of member. Those interested in the question of policy, especially in these days of Group Holding Companies' activities, will be interested in the details he gives as to the financial position of each of the Companies at the time of the amalgamation and the results after some years, while many of the younger members will profit by the description of the reconstruction of the Works and the reorganization of the staff.

The Paper, like many others, does not lend itself so much to discussion as to quiet perusal and thought, and the figures given in the tables will form a welcome addition to one's file of similar information.

His remarks under the heading of "Consideration of Amalgamation" give his views very frankly and will very generally be accepted. The change in financial requirements for distribution under modern conditions is dealt with, and his view that "Gas is the only public service which can offer a source of heat and light for all purposes in a council house at a price which a tenant can afford; and gas does it with greater efficiency, practical and national, than electricity. To install both in such houses, each to do only part of the work, is uneconomic and increases the cost of both services in addition to increasing the capital cost of the houses," while being accepted as being good sound economics introduces the difficulty so often encountered that tenants, for one reason or another, so often want what they have not got.

The Author stresses the importance in any business of personal contact, and while he gives a figure which he considers as not being a limit of the size, leaves the question open for discussion. It would be interesting to hear the views of members on this point.

The Position of Birmingham.

Mr. E. B. TOMLINSON (Birmingham): In the course of his remarks this morning, Mr. Briggs made some reference to the position of Birmingham. I have not come here necessarily to reply to that reference, because I did not find it in the printed Paper; but it has occurred to me since he has spoken that the local patriotism which caused Joseph Chamberlain, in 1875, to acquire the two gas companies which were then in operation in the Birmingham and Staffordshire area was a very good thing, no doubt, at that time; it also caused the claiming of the same privileges by various other local bodies, as explained by Mr. Briggs, and all went well for a number of years. Possibly it may be viewed as a pity, in view of more recent knowledge, that those two companies were not allowed to join hands, as was their intention in 1875, for thus we should have had one huge company controlling the gas supply of practically the whole of the Black Country and Birmingham (Mr. Briggs might think Birmingham is part of the Black Country!). Of course, the difficulty at the present time is the local patriotism—to apply to it a nice term. I do not think, however, that Birmingham need be considered as standing in the way of joining hands. For several years now we have been precluded from applying any profits to the reduction of the rates, so that in respect of the Birmingham area the objection with regard to applying profits to reduction of rates has been removed. I see no difficulty in the formation of a Gas Board. However, my remarks are made, without very much preparation, in view of what Mr. Briggs has said this morning.

The Paper will be very useful for reference whenever we consider amalgamations or joining up, or the dismantling of old works, with a view to supplying cheaper gas to our consumers. But I should like to refer to the effect, in amalgamation schemes, of the cost of boosting and transmitting gas from one district to another. In this instance it may be noted that the Brierley Hill Works are at an altitude lower by 215 ft. than the Dudley Works. The main is of 10 in. diameter and is 6,200 yds. long. I think it may add to the value of the Paper if the Author would state the various other particulars of the boosters and of the main—particulars such as the maximum rate of flow, the pressure drop between the two ends, the horse-power or the steam consumption, the capital cost, and the running costs. It would also be interesting to know whether Mr. Briggs based his calculations on Dr. Pole's, Professor Unwin's, or Cox's formula, and how near were the actual results to the theoretical. It would be ungracious of me to expect Mr. Briggs to answer those queries this morning, of course, but if he would give the information later for the benefit of the members of the Institution it would be useful.

The only other point I should like to refer to is the saving due to amalgamation. In Part VI. of the Paper it was estimated at £3,000 per annum, but actually it was more than double as much—more than £7,000, as shown in Part IX.—in spite of the actual capital costs exceeding the estimated figues. No doubt some of that is due, as Mr. Briggs indicates, to an increased output of 8·1 per cent., but at the same time it points to the need for a bold policy when considering amalgamation schemes. His figures of the savings effected agree closely with estimates I prepared

when considering a somewhat analogous case some years ago.

Joint Area Working.

Mr. R. J. RESTALL (Stalybridge, Cheshire): In May, 1934, my Committee instructed me to report on joint area working as distinct from amalgamation or even the formation of a joint board. The opinions offered are therefore after two years' close study of this subject.

The Paper gives one an opportunity to express views, particularly as the Author infers that some improvement is likely other than by amalgamation or joint working, with which I agree, but we should realize that it would take a long time.

Mr. Briggs refers to the innate strength of the Gas Industry being *the* difficulty of easy amalgamation. I would like to use the word " cause " in place of " difficulty." I only partly agree with this statement, the other cause, and a commendable one in my opinion, being that there are yet remaining directors and committee men who consider before everything else public service.

I know the district referred to in the Paper very well, and consider Dudley and Brierley Hill very well suited for amalgamation. Figures shown in the Paper are forceful and do indicate the advantage which has been obtained, but I am glad to note that also the importance of personal contact with provincial consumers is mentioned, and also the Author appears to understand very well the so-called parochialism as expressed in the penultimate paragraph of the Paper. Generally, my study of the subject leads me to the conclusion that the Gas Industry is at the tail end of amalgamations—all the largest and most important industries have undertaken some form or other of co-operation, joint working, or amalgamation, and from Governmental assistance and pressure it appears that the coal industry will be amalgamated or co-operated long before the Gas Industry. Good cases may be made out for geographical groups, but I place some importance on linking industrial considerations with the geography of districts; if the Gas Industry proceeds as it is doing at present the industrial and geographical point of view cannot be ignored because we must agree that industry, more particularly in some areas, will be the making or marring of the use of gas, and any scheme of co-operation or amalgamation should have this aspect in view.

While companies and even some local authorities may agree to amalgamate I feel that municipal consideration may be the greatest obstacle to amalgamations, but on the other hand municipally-owned undertakings might favourably consider joint area working, and should concrete proposals be formulated a surprising example of co-operation might be set. Parting with a publicly-owned service strikes me in the same light as the Gas Industry giving the coke oven industry the right to sell gas, and perhaps a more poignant illustration can be given in the Gas Industry as it might be doing to-day parting with itself to financial interests. Whether or not amalgamations will proceed fast enough to give us the necessary unification of working is not possible to say, and even what co-operation has taken place it has taken years to accomplish, but in that direction success has followed success, and I offer the five outstanding examples—tar sales co-operation, the London and Counties Coke Association, the Federation of Gas Employers, the formation of Industrial Gas Centres, and the poster scheme inaugurated by the B.C.G.A.

Guidance and Control of Policy.

Where guidance and control are established as far as policy is concerned a greater measure of success is possible —which success could be obtained by joint working—and unless the really small concerns are absorbed or assisted or some form of co-operation is set into motion I think the overwhelming unified kick from the electrical industry will force those particular parts of the Gas Industry out of business. The definition of a small concern to my way of thinking is one " unable to cope with modern demands, sell cheap gas, and pay its way "—this is irrespective of gas output and brings me to refer to the Author's reference " of the standard set by the premier gas undertakings," the size judged by output is not the only factor influencing the qualification " premier; " initiative and enterprise are necessary and sometimes are found even in places where money is short. Here, of course, are included those financial concerns which I suppose are quite willing to take 2 per cent. or 3 per cent. interest on money lying idle, which presents the other side of the picture. A lot of the money subscribed recently to form amalgamations has been from private sources, which method may mean that although we think we are still " holding on," actually the Industry is passing to other hands. Confidence is only begot by a clear authoritative statement from those parties concerned, and until some definite indication as to where this process is leading us is made doubt will exist.

If gas concerns are good enough to sell now they will in my opinion be of much more value later on. To bettering public condition has been the aim of this Industry as a body for long enough, and it would be making a distinct contribution to bettering its own condition by still closer working, which would in turn enlarge its function as a public utility.

Whereas to-day the tendency to co-operate is increasing, amalgamations, generally speaking, have nearly finished and the process of de-centralization is commencing, and this is true even in the Gas Industry because certain methods of amalgamation or grouping indicate that they are being carried out in a de-centralized form. A great deal of our prestige is founded on public utility service, and therefore sufficient control must be left to individuals who are " gas and service hearted." Financial acquisitions, if they are being made, can provide the means, but they cannot provide the heart, and I foresee eventually that the Gas Industry will pass out from among us via what may be described as " Gas Lords," who, when they have secured sufficient control will pass on this Industry to the Government. I think also in the interim period that it is possible that such control may lessen the fundamentals of public utility. One can foresee the end of public utility service brought about by Governmental treatment as far as the electrical industry is concerned; it truly is in my opinion a force and not a service.

Business amalgamations are made generally to secure collective advantage or to minimize collective disadvantage. The electrical grid has been formed to satisfy a visionary demand, and it appears to be working by grasping everything and is forcing itself upon sometimes very unwilling people. It seems that municipal ownership will in many cases withstand the pressure of amalgamation for some time, but joint area working would be an excellent manner of bringing about simultaneous actions of a specified policy because after all is said and done that is what we really require.

In conclusion co-operation is inevitable, it is everywhere, and it is paying. Further, it appears to be one of the soundest forms of evolutionary advance, and I think that some scheme brought about as quickly as possible for joint working holds out as great, if not greater, possibilities as compared with amalgamations. The elimination of individual effort has not the qualities to commend it to the logical mind where progress is called for, and it is an economic truth that where concerns become too large then inefficiency creeps in and a general decline commences. There is, however, one satisfactory aspect of the amalgamation methods being adopted within the Gas Industry up to the moment, and that is, the major portion of control of undertakings appears to have been left with the man on the spot. Perhaps this may have been brought about from lessons learned during the past few years of amalgamations in other industries, which have not been too happy and which do not show clearly the benefits which were expected; economists are not altogether agreed that the so-called benefits have been obtained.

The Gas Industry must act as a single body, wider views must be taken, and everybody's opinion or experience be taken into account.

Consideration and Results of Amalgamation.

Mr. A. L. HOLTON (Manchester): The two sections of the Paper that I wish to refer to particularly are those dealing with considerations of amalgamation and the results of amalgamation. The first and foremost duty of every gas undertaking, we must agree, is to provide the consumers within the prescribed areas of supply with an adequate supply of gas at the lowest possible price. That obligation should be carried out, irrespective of whether the concern is municipally or privately owned, but it must be admitted that the degree of administration varies very considerably. If, therefore, an undertaking having an efficiency of 100 per cent. is amalgamated to an adjoining area having an efficiency of only 50 per cent., the 50 per cent. being due to bad management, it is obvious that the combined results after the amalgamation will show an improvement. Taking a hypothetical case of two adjoining undertakings, both well managed and each being 100 per cent. efficient, would Mr. Briggs recommend amalgamation as being beneficial in that case? The point is that amalgamation is either right or wrong in itself, irrespective of management; otherwise there arises the ludicrous position of amalgamation being right only where management is efficient and being wrong when the management is inefficient.

The main benefits of the amalgamation discussed in the Paper go to Brierley Hill. In the Paper the Author stated that " very much wider scope is possible when working in bigger units." But there is a definite limit to economies

arising from an increase in output. "The greater the output the lower the cost" applies particularly to mechanical units, but there is a definite limit. Statistics show very clearly that throughout the Industry small undertakings can produce gas as cheaply as, if not cheaper than, many of the larger undertakings. While amalgamation gives great scope for economy, it does not by any means ensure it, the personal element being a very great factor, particularly in the Gas Industry. All will agree with the statement at the end of Part III. of the Paper, that "overcapitalization is unhealthy and indefensible." Yet amalgamations invariably result in the capital being much greater than the value of the assets. The Gas Industry is no exception to the rule, as is apparent from the activities of Holding Companies. The inference that the capital of a company is dependent on the market value of its shares is fallacious; the market value of £100 of 7 per cent. preference shares at the present time is considerably more than £100. That is due mainly to the fact that interest rates are particularly low—say, 3 per cent. Assuming that there were suddenly to arise a big demand for capital, and interest rates rose to 10 per cent., obviously the market value of a 7 per cent. preference share would fall below par.

The engineering features of the amalgamation of the two undertakings are particularly interesting; and I should like Mr. Briggs to say, with regard to the figures given at the end of Part VII with regard to coke, for comparison with the figures in Table 6, whether they represent the coke in the hopper or the coke in the lorries. I am particularly interested in sales of coke and the sizing of coke.

Similar Amalgamations Needed.

Mr. G. M. GILL (London): I have read Mr. Briggs' Paper with the greatest interest. Not only has Mr. Briggs done the job well, but he has shown many others the way to go and do likewise; similar amalgamations or absorptions should be carried out in many parts of the country. There must be fifty cases which could with advantage be treated in the same way as the Undertakings at Dudley and Brierley Hill. I have a place in mind where there are five undertakings, selling about 1,000 million cu.ft. of gas per annum and serving a district measuring only 9 miles by 5 miles; of course, there are five works there, and the overhead expenses of running five undertakings instead of one are very extravagant. That case simply cries out aloud for our competitor to step in and take the business that we ought to have. So that I think Mr. Briggs' Paper is very timely and very useful. The extent of amalgamation and absorption that is going on is really much too small; a generation will pass before any really big effect is felt. The coming of the Holding Companies was simply brought about by the Gas Industry itself, for the people concerned sat down and talked, but did nothing, and left it to the Holding Companies to come in and do the business. That is as I see it, anyway.

I was interested to see Mr. Briggs' reference to the need for better gas, absorption brought about for the supply of better gas. My experiences around the country have really amazed me, for the gas supplied in many cases is very poor; when I have received the test figures I could hardly believe them. In the smaller works there is no chemist and no instruments and the poor man in charge has no means of knowing what the quality of his gas is, so that we cannot blame him. But the supply of gas of bad quality is a very bad thing for the Industry, and if amalgamation or control by Holding Companies having experts in charge brings about an improvement in the quality of gas it will do a great deal.

Mr. T. H. POULSON (Stafford): In Table 5 (Part VII) the Author refers to the safe maximum working capacity of the coal gas plant, and I should be glad if he would amplify the word "safe." Has he allowed for scurfing, or has he allowed for any possibility of collapse of plant? I should also like to express my appreciation of Table 6 (Part VII), relating to spot tests on ungraded coke, because I think we do not pay sufficient attention to such spot tests.

Finally, I should like to congratulate Mr. Briggs upon his potentialities for the development of gas supply. He has a population of 100,000 in his area, and the gas output is 500 million cu.ft. I am sure he will be able to increase that output very considerably in the near future.

Mr. Briggs Replies.

Mr. BRIGGS, replying to the discussion, said: As Mr. Terrace has pointed out, the Paper is really a record of facts and does not lend itself to a great deal of discussion. I am very pleased that Mr. Tomlinson does not expect me to reply in detail now to his questions concerning the boosters; I will do that in writing. But the boosters were put in not merely for the purpose of sending gas to Brierley Hill; they will eventually be used also to boost up the supply in the low-pressure district. We are now putting in connections from the high-pressure main (which takes gas to Brierley Hill) to the weak spots of our district through which it passes, and that is helping us very considerably with our low-pressure distribution system, more particularly in Dudley.

The figures of estimated saving, of course, were arrived at in 1930, and the actual saving was effected in 1934-35, which fact accounts for the actual figure being very much bigger than the estimated. It certainly exceeded our expectations, but does not exceed our estimate by so much as is indicated by the figures quoted by Mr. Tomlinson. During the period there was an increase of gas output, and other factors.

Mr. Holton has asked a very important question as to when amalgamation is beneficial, and in reply I should like to ask what is his definition of a company that is "100 per cent. efficient?" I would not suggest that if Manchester amalgamated with Birmingham it would bring a very great advantage to either, though, on the other hand, it might; I would not suggest that if the Gas Light and Coke Company bought up the South Metropolitan Gas Company, that would be of advantage—but it might. I am sure of this, however, that a small company which is supplying only 200 million cu.ft. per annum cannot under any circumstances operate at what I should call 100 per cent. efficiency. It cannot afford to pay for a staff having the capacity of those of a larger company to investigate its problems and deal with those problems. Therefore, I suggest that practically any company supplying up to, say, 1,000 million cu.ft. a year, though I am not suggesting that as a hard and fast rule as to size, does gain in strength by amalgamation.

It is suggested by Mr. Holton that the majority of the benefits arising from the amalgamation described in the Paper will come to Brierley Hill. I do not agree. The greater part of the reduction in the cost of gas will come to Brierley Hill, but, as I have set out rather delicately in the Paper, there are other advantages. People have come to the Dudley showroom and have bought appliances when they have been living in Brierley Hill, and have expressed opinions about the Brierley Hill supply. That is reacting on the supply in Dudley; no company, however big, can afford to have on its borders another company which is less than 100 per cent. efficient (if I may use Mr. Holton's term), and I think that amalgamation under any circumstances has its advantages, although, obviously, the bigger the company the smaller is the advantage.

The figures relating to graded coke, at the end of Part VII of the Paper, do not represent the quantities of coke going into the hopper or into the lorry; they represent the weighbridge records of coke actually sold, which I think is a more stringent test of the capabilities of the screens. I have tested the screens themselves by means of spot tests, and they vary between 80 and 90 per cent. efficiency; by that I mean that 80 or 90 per cent. of the total amount of the coke they handle is in the sizes which the screens are supposed to give.

Finally, when stating the "safe maximum working capacity" of the coal gas plant, in Table 5, I was not allowing for "acts of God" and things of that kind. By "safe maximum working capacity" I mean the maximum maintained capacity, allowing for scurfing and normal repairs.

(Communication No. 132)

The Two-Part Tariff as an Aid to Gas Sales

by

JOHN T. HAYNES

(Formerly Engineer and General Manager of the Rotherham Gas Department)

Mr. W. B. McLUSKY (Halifax): Mr. Haynes, in one of his last conclusions, makes reference to advertising. We agree that this is the proper way to approach the subject. Newspaper advertising is the official means of approach, and it is the gentle way. The circular is the aggressive way. The circular is not English because it is not properly introduced. A circular is sent by post and is often lost, and at the best it is a poor cringing thing. Newspaper advertisements, however, put gas in its proper place at the top or in the front row.

In his conclusion Mr. Haynes indicates that a service-rental based upon the rateable value of the premises might be adopted with advantage. Mr. Haynes' point is, I think, that a larger sum would be collected in the form of a service-rental and that the amount to be collected as the price of gas would in that case be advantageously low and competitive with raw fuel. I think that is Mr. Haynes' object from first to last. He suggests a service-rental equal to from 10 to 15 per cent. of the rateable value of the premises. I have worked out two examples on this basis; Halifax and a neighbouring town. A service-rental based upon 15 per cent. of the rateable value of Halifax would yield a much larger sum than the present service-rental and would enable the Committee to reduce the price of gas to 3d. per therm. In the neighbouring town a service-rental based upon 10 per cent. of the rateable value would enable the undertaking to sell gas at 2d. per therm. I have drawn this parallel to show that in Halifax, where the rateable value of the premises is comparatively low, the consumer would have to pay a half more in service-rental and a half more for the commodity than the consumer in the neighbouring towns. These are the facts, and, as Emerson said, "The great facts are the near ones." The explanation is that the overhead charges, for example, on the Halifax Undertaking and many others are relatively high and the rateable value in Halifax, as in many others towns, is relatively low.

Service-Rental Basis.

Mr. Haynes says: "The rateable value of similar houses varies not only between one town and another but between houses in different parts of the same town." The basis upon which the service-rental is based must be an arbitrary basis. The service-rental for domestic premises in Rotherham varies with the number of rooms in the house. The service-rental for domestic premises in Halifax varies with the size of the living and reception rooms only. In some other towns the service-rental for domestic premises varies with the number of available rooms that are used and not the rooms that are locked up. Mr. Haynes suggests that calculations based upon floor area tend to arouse suspicion, but there are no suspicious people in Halifax! The Halifax system has been working continuously for 24 years on the floor area basis without complaint—sez you! (Laughter). The floor area basis is the nearest possible approximation to the potential user of gas. It bases the consumer's demand upon the rooms in which gas is, for the most part, used, and leaves entirely out of account those rooms that are only inhabited for a short time. It is true that in a large house the maximum demand must be provided for, but Mr. Haynes and I—it may be mere coincidence—have arrived at the same maximum service-rental for domestic premises regardless of the size of the house or the consumer's demand. Mr. Haynes' scheme has been astonishingly successful; but would it have been more successful had the service-rental, especially at the start—the figure of 10s. 10d. for a four-roomed house—been less? I think the scheme would perhaps have been more successful had the service-rental been less and the price of the therm more. My complaint about the Halifax scheme is that the price of the commodity—6d. per therm—is too high. But, in spite of this disadvantage, the sale of gas per consumer on the two-part tariff in Halifax is greater than that of Rotherham. That, however, does not say that the Rotherham scheme will not develop. It is a good scheme, and no doubt business will grow. This higher consumption of gas in Halifax may be due to the fact that that service-rental in a great many houses is low—varying from 6s. 6d. per quarter to 26s. per quarter. I am constrained to draw attention to this point because the Rotherham maximum and the Halifax maximum are the same figure—viz., 26s. per quarter—but the Rotherham minimum is 10s. 10d. as compared with the Halifax minimum of 6s. 6d. If the object of a two-part tariff or a multiple tariff is to increase revenue, it would appear to be necessary to make the tariff wall as low as possible—to make it infinitely low. That is only an argument; it is not an opinion.

Flat Rate in Competition with Two-Part Tariff.

It must be acknowledged that a consumer of gas living in Rotherham in a house with four principal rooms can get all the advantages of a two-part tariff without adopting the two-part tariff if he uses only 20,000 cu.ft. per annum. In other words, if a consumer uses 5,000 cu.ft. per quarter he is just as well off if he does not adopt the two-part tariff. In other words, the flat rate in Rotherham is so low that it is competing strongly with the two-part tariff. It must be very difficult for Mr. Haynes to sell gas on a two-part tariff with a flat rate of 3s. per 1,000 cu.ft. or 7·2d. per therm. A consumer of gas in Rotherham may buy only 3,000 cu.ft. of gas per quarter, and at 3s. per 1,000 cu.ft. the total account for the quarter is only 12s. If we deduct the Rotherham service-rental for a house of four rooms—10s. 10d.—there remains 1s. 2d. for the 4,000 cu.ft. of gas, so that this consumer is buying gas at 3½d. per 1,000 cu.ft. or 0·7d. per therm. That, however, is not a point against Mr. Haynes' scheme. On the contrary, I think it is a very creditable thing that small consumers are able to buy such small quantities of gas at such low prices.

To be quite fair to Mr. Haynes and his scheme, it ought to be said that the 1,274 consumers—360 ordinary meters and 914 coin meters—who have adopted the two-part tariff are not the only consumers of gas in Rotherham who are enjoying the advantages of cheap gas. I have given you one example of that, but what a pity it is that this small consumer is not conscious of the fact that he is enjoying all the benefits of the two-part tariff and is buying his gas at a lower price than those who have signed the two-part agreement. But the question for the consumer to answer is this—Could he use more gas to his own advantage? If he could do so, he should adopt the two-part tariff because the consumer who is consuming 4,000 to 5,000 cu.ft. per quarter will have to pay 3s. for his next 1,000 cu.ft., whereas if he takes the two-part tariff he will only have to pay 10d. for that 1,000 cu.ft.

Mr. Haynes points out that the number and variety of tariffs in the Gas Industry is growing. One of our Technical Papers, dealing with two-part tariffs recently, said: "Policies and practices are kept in a state of fusion," and then proceeded to make the following statement in regard to two eminent engineers and managers of gas undertakings in this country: "Both are keen believers in the efficacy of tariffs—that is, if they are the right sort of tariffs. They are equally prepared to make rates to suit any demand and, working from cost upwards, to make them into business promoters." Another writer remarks: "That rates always lack appeal when they are based on the stifling method of the allocation of cost." I do not know what that writer means, but he has perhaps found from his experience that it is difficult, if not unfair, to ask every user of gas to bear his fair share of the cost of providing for and maintaining a supply of gas. In my own experience, the allocation of the cost fairly between consumer and consumer is part of the day's work. We know what the consumer is paying and what his fair share really is. The quantity of gas used by consumers in Halifax who have adopted the multiple tariff ranges from 16,000 cu.ft. to over 700,000 cu.ft. per domestic consumer per annum, but the larger quantity is only in respect of one house. The quantity consumed, however, is from 16,000 cu.ft. per annum.

Paying Rates Twice Over.

Mr. C. S. SHAPLEY (Leeds): Mr. Haynes says: "For many years part of the profits of the undertakings have been used for the relief of local rates." To municipal gas engineers I say that is definitely wrong. Why a gas consumer should be called upon to pay rates twice over, I cannot see. All the profits the municipality can make over and above their interest and sinking fund charges should be placed toward the reduction of the price of gas, which would help Mr. Haynes' tariff. Then again we see—and here I am going to be very contentious—that reference is made to the higher charge made to prepayment meter users. I cannot see why the prepayment meter user should be called upon to pay more for his gas than the ordinary con-

sumer. In saying that, I do not want any reply or criticism to-day, but I would like the accountancy staffs of the various undertakings represented here to see which costs the most to collect—the ordinary consumer or the prepayment consumer. I venture to suggest that having regard to the cost of the prepayment attachment you will find that the prepayment consumer is the best consumer and should be given equal terms in equal circumstances—which is what we are asking for in the Coal Mines Bill.

I quite agree with the policy of the Rotherham Corporation in selling gas appliances outright. That is a splendid thing as a policy which should be followed. We in Leeds and many other of my colleagues in Yorkshire have adopted that policy with great success. There is no doubt about it that when an appliance is bought there is an interest taken in it, and the consumer is loth to depart from it. As a matter of fact, a consumer does not buy an appliance with the idea of not using it; that has been our experience. I rather disagree with Mr. Haynes where he says the Gas Industry might usefully concentrate on selling gas and not dissipate its energy by trying to sell two competitive fuels—gas and coke. We have to sell coke as well as gas. We cannot make gas without making coke; we have not all got water gas plant yet. I have, but the majority of my friends here have not, and consequently it has to be a dual purpose scheme. We have to sell coke as well as gas, and if we can sell coke where we cannot sell gas I maintain that it is very good business. Therefore, do not turn down Old King Coke; let us try to sell coke-cum-gas, and in that way we come to the gas-coke fire.

Finally, with regard to the life of gas appliances, I want to pay the highest tribute to the manufacturers. They have done wonderful work for our Industry. In their own research laboratories they have helped the Industry tremendously, and it therefore remains for us to help the manufacturers by giving them the benefit of our experience when their apparatus gets on to the district. By so doing, we can help the Gas Industry and, incidentally, the gas appliance manufacturer.

Schoolboy Calculations.

Mr. H. Dixon (Nottingham): Somebody ought to thank the Author for his final statement, where he says: "The Author has been criticized for calculating his rate structure in the manner of a schoolboy with a book of answers. At least the results indicate that the answer is correct." I think that forms the basis of a very useful discussion. So far as I can see, the position is that Mr. Haynes first of all decides that 10d. has got to be his answer; that 10d. for his gas must be what he is to aim at if he is going to compete on the B.Th.U. basis and an efficiency and utilization basis only. I am not satisfied that that is the correct basis of comparison, because surely some credit must be given for less labour; and while we cannot do with a maid less in a small house, there are other advantages, such as smoke abatement, less dirt, and so on, which should be taken into consideration. Mr. Haynes not only starts with 10d., but in his final word he says: "At least the results indicate that the answer is correct." Therefore, having started with that, he works all his figures to give him 10d., and then he sits back in his chair and puts his thumbs in the armholes of his waistcoat with a sort of attitude of "Well, at least I have proved the answer is correct." In other words, it is just as he expected! He has gone to all this trouble knowing in his own mind what the answer will be and what he is going to do, and then finishes up by saying: "At least the results indicate that the answer is correct!"

I did not hear Mr. Haynes present his Paper, but it seems to me that he is in a very fortunate position at Rotherham. He is in an exceptional position, and I doubt whether there are any of us in a similar position to consider such figures as 10d. for our gas. I admit that we should probably be given a little higher figure than that if we were to compare the price of coal in our own districts, but not materially higher. In Nottingham we should have to be supplying gas at 11d. to compete with the price of solid fuel.

I was glad to see that Mr. Haynes sets out a sort of possible consumption figure, and I agree with him that the prospects are almost frightening in their immensity, as he points out. It seems there is such an opportunity for us that some sacrifice should be made to get down to a tariff which will induce such consumptions. I should like Mr. Haynes to tell us—dealing with his prepayment consumers who pay weekly service charges—whether he has had any number of bad debts. There again, Mr. Haynes has been in a very fortunate position inasmuch as he has been able to persuade his municipal authorities to do his collecting for him in the municipal houses. In the case of the other houses, however, where I understand the consumers pay their service charge weekly, I should be glad to know if he has had any considerable number of bad debts.

The Author gives the figures of gas used for the December quarter, 1931, but I am rather surprised that these figures are not a quarter of the annual consumptions. In other words, the gas used in the December quarter is not 25 per cent. of the gas used for the twelve months' period. I am not sure if I read that aright, but, if so, there seems to be some condition which is peculiar to Rotherham, because our own figures show a very much higher consumption for the December quarter than 25 per cent. of the annual consumption. If that figure is influenced by some special consideration of weather or something else, and if it is not a true figure, then the whole balance of the Table and the increase we really can expect is rather thrown out. In other words, the economics of the Table is very materially altered. Again, Mr. Haynes is enabled to charge his extra gas purchased at 6d., which is a figure some of us would like to be able to reach—I mean those who are having to manufacture their own gas.

One other point—Mr. Haynes gives a very important figure. He says: "Calculations at Rotherham indicated a maximum possible loss of £4,933 per annum." That is an interesting figure, and it seems to be borne out by others. Mr. Haynes' experience has indicated that it is not every consumer who would gain an advantage from a two-part tariff. That has been shown by several Papers in the past, and Mr. Haynes shows there are more and more people coming on to the two-part tariff each year; at the same time the Table which shows this appears to prove that as more and more people come on to the two-part tariff the net increase in revenue is becoming less and less. The inference to me is that while only a few people come on to start with, gradually it becomes known and people realize it is going to be an advantage to them. They then come on in wholesale numbers until it becomes equivalent to a reduction in the price of gas.

In conclusion, may I say that this is a Paper by a tall man who has the advantage of being able to see over the heads of the crowd in the immediate vicinity. Mr. Haynes is not only a man of long vision, but a man who is, shall I say, determined to carry to the end any idea that he has in his mind which appears to him to be constructive, whether it is good or bad.

The Intention of Two-Part Tariffs.

Mr. C. A. Masterman (Gas Light and Coke): Before asking a question, I should like to suggest that Mr. Haynes' Paper on two-part tariffs is rather outstanding in not expressing any bias or any intention of being fair as between various consumers or, on the other hand, of being scientific. It does, however, set out quite definitely the intention of two-part tariffs as being to get more business, and Mr. Haynes proceeds to show the greater business that has been obtained in certain ways.

I was interested, however, in the Table in which he refers to a subject which seems to be of very great importance—viz., the consumption to be anticipated from the various domestic loads. You will see from this Table that it is suggested that nearly 50 per cent. of the load under a two-part tariff in an all-gas house is due to the gas fire. That seems to me rather a high estimate, and I looked at the curves at the end of the Paper, where Mr. Haynes gives his output for winter and summer, and tried to see whether there was any reflection there in his estimate. I should have expected, if the estimate had been correct, that his winter consumption, as the effect of the two-part tariff increased, would show an increasing disproportion as compared with the summer. I do not find any such disproportion, however. The ratio of summer to winter average load appears to me to remain the same as the total output progresses, and I should be interested to know what Mr. Haynes' explanation of that is; whether he has not obtained this very high output from his gas fire or, on the other hand, whether the other loads which he refers to have been a good deal lighter than the amount he estimated. The loads to which we can look forward do seem to be so important that I personally would value his opinion on that point.

Combating the Preference for Coal.

Mr. G. E. Currier (Bradford): It is stated in the Paper that gas at 18·1d. per 1,000 cu.ft. would be more expensive than coal; and later in the Paper the generally accepted comparative figures of 1 cwt. of coal being equivalent to approximately 1,000 cu.ft. of gas for domestic purposes appear, and, therefore, gas at 18d. per 1,000 cu.ft. is no more costly than coal at 30s. per ton. Household coal must be difficult to obtain at less than this figure. One difficulty which exists to a far greater extent in the North than in the South is the insistence of certain people who will still gladly pay anything from £2 to £3 per ton for coal to use

in the open grate for reasons of preference, regardless of expense and the numerous disadvantages which accompany the burning of coal in the open grate. The conversion of such people is a slow process in spite of forcible arguments put forward in favour of gaseous fuel at an economic price.

Mr. Haynes says the fashion for the use of gas must be created. At one time it was fashionable to use gas, and the fashion can only be renewed by demonstrating and proving that gas is a modern fuel which can conveniently and economically meet modern requirements.

Turning to the scale of charges, I am surprised that the same commodity price is charged in the outlying districts as within the Borough, and that an extra service charge is made in the former. I should have thought it would have been preferable to keep the same standing charges throughout the area, and to have increased the commodity charges in the outlying districts, particularly as the commodity charge is such a low one. Why should a house outside the boundary carry a higher service charge than one inside it? Has this given rise to criticism or dissatisfaction in the outlying districts?

From twelve months' experience with the use of the gas unit for advertising purposes, Mr. Haynes seems doubtful whether it has helped the sales of gas or appliances. I am disappointed to hear this, as I had always thought that it was in the realm of advertising that the gas unit could be of the greatest assistance to the Industry.

The Author suggests that for industrial purposes gas should be sold by all undertakings at equivalent standard regional prices. This may be an ideal, but is somewhat difficult to attain. Even among the units under the control of Holding Companies one still finds widely varying prices. I must join issue with Mr. Haynes in his statement regarding the sale of gas and coke. Those Engineers who manufacture gas realize only too well the beneficial effect the sale of coke has on the revenue account and in helping to keep down the cost of gas. Complete gasification on a large scale has not yet arrived, and in the meantime it behoves us to make the most of that precious residual, coke. In the industrial field it is not generally difficult, when one has knowledge of all the circumstances, to decide whether to recommend gas or coke for a particular load. For the domestic grate coke can be recommended to those who still insist on having at least one solid fuel fire, and incidentally the coke grate does help to secure another gas point in the house.

The point made by the Author that appliance manufacturers should give more attention to the production of domestic appliances which will operate over long periods without attention is interesting. Any help that the makers can give in this direction will help us materially, but it does not rest with the makers entirely—a higher degree of purity of the gas sold would also have a marked effect.

The Two-Part Tariff at Bradford.

I may be expected to say something about the two-part tariff at Bradford. This optional tariff was designed and recommended by my predecessor, Mr. E. Crowther, and it was put in operation on July 1, 1933. Prior to this date a block system of charges had been in use; but the blocks were not sufficiently steep, and during the five years ended March 31, 1933, sales dropped 11%.

The calorific value of the gas is 500 B.Th.U. The flat rate is 4s. 2d. per 1,000 cu.ft., or 10d. per therm, and the prepayment rate is 4s. 4d. per 1,000 cu.ft., or 10·4d. per therm. One of the outstanding features of the two-part rate is its simplicity. There are three classes of consumer only:

	Per Annum. £ s. d.
A. Non-parlour houses (one living room)— Standing charge 6d. per week	1 6 0
B. Houses with more than one living room— Standing charge 1s. per week	2 12 0
C. All other consumers, including industrial and commercial— Standing charge according to size of meter	2 12 0 to 50 0 0

In all cases the commodity rate is 1s. 6d. per 1,000 cu.ft. (3·6d. per therm), and both standing charge and commodity rate are subject to a discount of 5 per cent. for prompt payment. In the Rotherham tariff there are five classes of houses against two in the Bradford rate. The domestic consumer in a non-parlour type must use more than 10,000 cu.ft. per annum for it to be profitable for him to change over to the two-part rate, while in the larger type houses the consumption must exceed 20,000 cu.ft. per annum.

Now as to results. The Bradford two-part rate has been in operation for 2½ years, and the increase in gas consumption amounts to 126 million cu.ft., equal to 7 per cent., of which 50 million cu.ft. is industrial. These figures do not reveal that unknown quantity which is the amount of load which has been retained under the new tariff, and which would have been lost under the old system of charges. The number of consumers on the two-part rate is 23,500, equal to 24 per cent. of the total. Of these, 20,800 are domestic and 2,700 industrial. Consumers are still changing over to the two-part tariff at the rate of 75 a week. So far the two-part rate has not applied to the prepayment consumers, though many of them are changing over to it.

As in the case of Rotherham, no additional staff has been engaged to deal with the new tariff, and it has been found, particularly among the domestic consumers, that it takes time and effort before the value of the two-part rate is realized. When a consumer is near the border line consumption, it is not a very difficult matter to obtain an order for an additional appliance, by which the consumption is increased sufficiently to enable him to change over to the two-part rate. In the industrial field the service charge has to be sold, and the scales of charges previously given are all that we have, there being no special rates for particular processes. With regard to central heating, it is considered that this type of load does not warrant a lower price than that under the two-part rate. What the tariff lacks in flexibility it gains in simplicity.

The two-part rate, in addition to being a sales promoter, does provide a more equitable system of charging between one consumer and another, and between the undertaking and the consumer. Although I favour the two-part rate, there are block systems with concealed service charges which deliver the goods.

The Decreasing Sale per Consumer.

Mr. T. R. Cook (Blackpool): This Paper raises the important question of the decreasing sale per consumer which is engaging the attention of all connected with the Gas Industry at the moment. The problem is how to encourage consumers to utilize gas for all purposes. In order that this may compete nowadays it must be cheap and available even to the poorest person. While my experience of a two-part tariff scheme is limited to a few months, I am able to say that the Rotherham tariff is accomplishing what it was designed to do, and it continues to meet with success. All types of consumer are taking advantage of it and obtaining their gas at the cheapest possible rate. With a two-part tariff scheme in operation there is always the hope of new business. I am confident there is no limit to this method of charging providing the price of gas is low enough, and in Rotherham it is 10d. per 1,000 cu.ft. for the ordinary consumer and 1s. per 1,000 cu.ft. for the prepayment meter consumer. At the end of March the consumers on the two-part tariff scheme were just over 1,270, which is an increase of nearly 400 over the previous twelve months, while the average consumption per consumer has worked out at about 5,000 cu.ft. The pre-tariff consumption for the same people would be about 3,000 cu.ft. per consumer. It will therefore be seen that a substantial increase per consumer is obtained when they are transferred to the two-part tariff system. The public is being trained to become electrically-minded, and we must combat that with all possible energy; I am sure the two-part tariff is a means to this end.

Mr. George Helps (Nuneaton): I have come from my village of Nuneaton to speak in favour of Mr. Haynes. The day has arrived when gas can be sold in competition with solid fuel even to the cottage dweller. Mr. Haynes says that the price at which gas can compete with solid fuel is the important factor. Some years ago when I endeavoured to find what was the price at which gas could compete with coal I got one or two people to try using gas to the entire exclusion of coal. I let them run it all day and use what they liked, and I said I would not charge them anything for it. If they did not find it satisfactory I said I would throw it out and reinstate their houses not only as they were before, but in a better condition. The result was that at the end of eighteen months—you see I did not hurry about it—I said: "What about facing this thing and seeing where we are?" I asked what price they were prepared to pay. I had quoted definitely the winter scale for all purposes, including lighting. One man said: "I cannot pay any more than 6d. or 7d. per therm," expecting that I would ask a higher figure. I took him on, and he has been using gas ever since. He has not had an ounce of coal in his house, and at the present time he is paying 5d. per therm, and he says he would pay a higher price rather than go back to coal. In his house there are four people, and his consumption has gone up from 100 to 670 therms a year—it has remained at that for about five years. I take it that any two-part tariff will eventually resolve itself into a flat rate. I have been looking into the matter lately myself to see what I can do in my town, and I am seriously considering fixing the minimum consumption at 500 therms a year and charging a price of something like 4½d. per therm up to that quantity. At that figure we can compete with any solid fuel. Nuneaton is actually a coal village, and coal is sold there at from 30s. to 35s. per ton. Mr. Haynes' Paper proves that we can

compete with coal, and I ask you, if that is so, what is the value of our undertakings to-day?

Mr. J. H. CLEGG (Southport): I am particularly interested in the production of tariffs, having had some experience since the booklet drawn up by the National Gas Council was circulated. In 1928, when I was in Burnley, a four-part tariff was introduced for industrial loads, and within two years we increased the industrial consumption by 200 per cent. The industrial consumption there has increased since, and there can be no hesitation in saying that a three or four-part tariff is an important acquisition for developing gas for industrial purposes.

With regard to domestic purposes, we have had in force in Southport from 1925-26 a step rate system to include consumers of 10,000 cu.ft. who get gas at 6d. per therm, and, contrary to Mr. Helps' experience, I have never found any inclination on the part of consumers to take out raw coal and put gas in its place. We introduced a two-part tariff system based on the number of rooms in houses in which gas could be used, and it is rather interesting to notice that the fixed charge worked out very similarly to that mentioned by Mr. Haynes in the case of seven or eight roomed houses, and the commodity charge was 4d. per therm. After two years only 50 consumers took on this tariff, but at the end of that time there was an increased consumption of something like 2,000 cu.ft. per annum on the part of these 50 consumers. That is largely the experience of others who have promoted two-part tariffs. I do not condemn them, but I think the whole thing depends on the existing conditions at the time the tariff was instituted, and as to whether the tariff was sufficiently low in value. You can quite understand that with a fixed charge such as I have indicated and a commodity charge of 4d. per therm there is not sufficient inducement to the consumer to go in for a wholesale replacement of his solid fuel apparatus, and that is the reason I ascribe to this non-success. Mr. Haynes' position is rather peculiar. He is in the fortunate position of being able to increase the consumption of gas and provide gas at 6d. per 1,000 cu.ft. into the holder. Very few of us are in such a fortunate position. In my own case in Southport our gas into the holder is 2⅞d. per therm, so that if one adds the extra gas at 8d. per 1,000 cu.ft. to the 10d., the story is a very different one. In addition, we have not too much surplus plant available, and consequently some capital expenditure would be necessary. In Mr. Haynes' case, however, most of his capital expenditure in the way of gas manufacturing plant is included in the price of 6d. per 1,000 cu.ft. That is a very important point. All the same, I think Mr. Haynes has taken the best advantage to meet all the circumstances in which he finds himself. On the question of cost of repairs to meters, according to Mr. Haynes' figures I roughly work it out that the cost of repairs to slot meters is 5s. per meter as compared with 2s. for ordinary meters. Perhaps Mr. Shapley will notice that. I agree with hire-purchase as being of more advantage to the undertaking than simple hire. It is significant to note the small amount of money which has to be paid for the cost and fixed charges in comparison with the £2 12s. 6d. per annum, which is the cost of the instalment of the appliances. It is one difficulty which we have to face, and especially the additional cost of the meter. For instance, the meter may cost as much as 7s. per year, including repairs, interest, depreciation, &c.

Mr. Haynes has called attention to the comparison in the sale of gas to the price of coal, and I think that is very important. I do not know whether any other members are experiencing the strong competition from coal that I am experiencing in domestic consumption. Electric competition I do not fear at all, although in Southport the Electricity Department has a very low fixed charge and the price for current is as low as one-third of a penny per unit for cooking and heating. In fact, at certain periods of the year they sell current at ½d. per unit for heating and cooking without any fixed charge. Nevertheless, that competition is not so serious as the coal competition at the present time. I am finding scores of small solid fuel grates of the "Triplex" or bungalow type going in and replacing gas and electricity for cooking and providing hot water, thus going over again to the old back boiler.

I am very interested in the agitation that is proceeding against multi-part tariffs in the case of electricity undertakings. It is evident that the feminine portion of the consumers have been antagonized by the multiplicity of tariffs, and we shall do well to follow the deliberations in this connection and the results which are brought forth in connection with the consideration of these tariffs. Speaking of electricity again, perhaps many of you are aware that a very important official, I believe the Chairman of the Central Electricity Board, has the habit of going round to every town in the country and meeting electrical engineers, chairmen, and principal officials of electricity departments. They also have district meetings of electrical engineers, and these engineers have to place particulars of all their activities before this gentleman. They are being constantly urged to introduce certain improved features, and I am told on good authority that since the establishment of the Central Electricity Board, up to this year the cry has been thermal efficiency. Now, however, that has been dropped, and the cry is commercial efficiency. I think that is the cry *we* want. We must consider commercial efficiency, and this is a matter which, to my mind, depends entirely on a psychological consideration of our consumers.

The CHAIRMAN then closed the discussion, and a cordial vote of thanks was passed to Mr. Haynes for his Paper.

Institution Benevolent Fund

A General Meeting of the contributors to the Benevolent Fund of The Institution of Gas Engineers was held on Wednesday, May 27—Mr. STEPHEN LACEY in the Chair.

The HON. SECRETARY (Mr. J. R. W. Alexander) read the notice convening the meeting, and the minutes of the General Meeting held in London on June 5, 1935, were taken as read, and were confirmed and signed.

The CHAIRMAN then moved:

> "That the Report of the Committee of Management of the Benevolent Fund of The Institution of Gas Engineers for the year 1935-36 and Accounts for the year 1935, which have been printed and circulated to contributors, be taken as read and adopted."

Mr. C. F. BOTLEY (Hastings) seconded the resolution for the adoption of the Report and Accounts and expressed thanks to the Committee who had carried out the work during the past year.

The resolution for the adoption of the Report and Accounts was carried.

The HON. SECRETARY announced that the scrutineers of the ballot for the election of members of the Committee of Management had certified that Mr. C. T. Price (Hampton Wick) and Mr. W. W. Townsend (Colchester) had been elected to the Committee for the next three years in place of Mr. Thomas Carmichael (Portsmouth) and Mr. J. R. Bradshaw (West Hartlepool), who retired after three years' service.

Mr. W. B. MCLUSKY (Halifax) proposed a vote of thanks to the Committee of Management and the Hon. Secretary for their work during the past year. The amount they were subscribing and the amount they were paying out per annum represented less than 10s. per gas-works per annum. That seemed a very small amount. The Institution had no regard to the incomes of its members; they did not help those in small places to secure big incomes, and the least they could do was to look after those who were left when their breadwinners had been taken away. He had the greatest possible pleasure in proposing a hearty vote of thanks to the Committee of Management and the Honorary Secretary for their services during the past year—which included their Chairman.

Mr. W. E. PRICE, in acknowledging the vote, said: I had not expected to reply to this vote of thanks, but it gives me much pleasure to do so because I know the anxious work that has to be carried out during the year in considering the applications for relief under the Benevolent Fund scheme. I am sure the members of the Committee thank you all for your expression of appreciation; but they would thank you very much more if they had more funds at their disposal. Applications are received, and the knowledge of those which have to be refused, and those in respect of which grants are made (those grants are very small), weigh on the minds of the Committee. There is only one cure for that trouble; it is that those who do not contribute should do so and that those who do contribute should contribute still more. I hope that these remarks will sink into the minds of those who contribute, and still more into the minds of those who do not yet contribute—I hope I am not speaking entirely to those who do! On behalf of the Committee, and its Chairman, I thank you for your expression.

The meeting then terminated.

(Communication No. 133)

Heating Problems Arising in Industrial Gas Sales

by

T. H. PARDOE

(Chief Industrial Gas Engineer, Stretford and District Gas Board)

Mr. W. DIETERICHS (Gas Light and Coke): My chief comment is to ask for more, particularly with regard to the installations and the results obtained. I hope Mr. Pardoe will complete the standard installation sheets for circulation to all Centres so that such information will always be readily available to all undertakings.

I am rather doubtful regarding Mr. Pardoe's suggestion that Industrial Gas Sales representatives should be furnace maker trained, because Mr. Pardoe must know that with the exception of a few undertakings, furnaces form quite a small outlet for industrial gas. In my opinion the industrial gas salesman must have good general knowledge of various processes such as steam raising, oil boiling, drying, bread baking, &c., and it would not be practicable or economical to train men in all processes which require specialized knowledge, particularly with the smaller undertakings. I suggest it is much better at the start to call in the manufacturer who has a thorough knowledge of the process in question, and whose representatives have a varied experience from all over the country. Unfortunately, in many cases undertakings are treating enquiries for industrial processes almost in the same way as they receive an enquiry for a cooker, when the enquiry could obviously be much better handled by, say, a firm of Chemical Engineers in co-operation with the undertaking concerned, to the mutual advantage of both.

Mr. Pardoe has also raised the question of bright annealing which has been receiving considerable attention, not only in this country, but in America and Germany. The Technical Sub-Committee has for some time, as suggested, been collecting data and information, and I know that Sheffield, Birmingham, the South Metropolitan Gas Company, and the Gas Light and Coke Company are all carrying out experiments on different lines and periodically comparing results.

I feel, however, that while the process of bright annealing may be very important to such places as Birmingham, Sheffield, and other large industrial towns, if it is really as important as we all think it should be treated as a national problem. In this country at the present moment there are about 30 to 40 competent Research Associations, and surely as this is a metallurgical process, it is a matter for such an Association as the British Non-Ferrous Research Association to investigate and develop. I know the objections to this, but the actual gas consumption for purging the annealing chambers varies between 10 per cent. and 25 per cent. of the total gas consumption of the furnace in question, and I suggest that the Gas Industry would do much better in improving the technique and design of gas furnaces rather than embark on a metallurgical process which would be common to all types of furnaces. Again, the load, beyond a few towns in this country, may not be quite as large as we anticipate, and before any great expense is incurred in the development of this process I think we should consider this matter very carefully. I think we would all agree that it is the gas load which we are after and not the sale of equipment.

It might interest you to know that in London a dozen bright annealing furnaces would practically cover the requirements—that is, if we refer to bright annealing as distinct from scale-free annealing, which is quite a different matter and which is much more simple to obtain, whereas there are approximately 2,000 side-flue ovens capable of being fired by gas, and we have already found, from experiments carried out on 21 ovens, that the average consumption per oven is approximately 185,000 cu.ft. per quarter. I am mentioning this because I feel, from a gas consumption point of view, it is obviously a much better load to develop in London.

"Special" Installations.

Mr. H. R. HEMS (Birmingham): Though some of the installations to which Mr. Pardoe refers and gives details of results obtained are undoubtedly "specials" and hardly likely to be met with in all industrial areas, work of this kind and the data obtained therefrom always have great value when considering other industrial heating processes which may be similar in some respects.

In dealing with these installations, I wish that Mr. Pardoe had followed his own line of thought in the introduction to his Paper, and given us further particulars of the competitive fuels which were in use prior to the adoption of gas as a fuel. Comparisons of design and costs of running would have been extremely valuable. Further details of the furnace settings, particulars of gas and air pressures, and similar information would also be very useful in connection with the gas installations described.

I am glad Mr. Pardoe has made further comment in the light of his American visit, on the section of his Paper on bright annealing. The subject is full of difficulties, as he no doubt appreciates. When Mr. Pardoe leaves actual installations and experience with gas furnaces and discourses on what may be termed policy, I am afraid I have to join issue with him on many of the points he raises. Whether he has raised them with a view to furthering discussion I do not know.

He states that all information, &c., given at any meeting of the Gas Industry is carefully filed by the Electric and Oil Industries. I suggest that in Mr. Pardoe's introduction and in some of his later remarks these industries will find cause for satisfaction and a spur to re-double their efforts against us. I am inclined to suggest that we are doing a little too much introspection publicly. By all means let us analyze our position continually in the various Committees which are now responsible for industrial gas business, but we have sufficient evidence of successful business in increased gas loads and very fine furnace installations up and down the country to enable us to make a greater show of success to the manufacturer than we appear to be doing at present. I read very few public statements from either of the two industries mentioned by Mr. Pardoe, which tell us anything but the great successes they are achieving, and I think we need to do a little more of this ourselves.

Service with the Furnace Maker.

On the subject of training, Mr. Pardoe considers it essential that industrial gas engineers should have seen service with a furnace maker. While appreciating the value of co-operation with furnace makers, which we, in Birmingham, practise to the fullest extent, I cannot agree that such service is essential.

Many industrial processes are inherently "Gas" and I would rather Mr. Pardoe had put a gas experience first and experience with a furnace maker if such admits of arrangement as an ancillary. After all, each furnace maker has his own special ideas of furnace design and possibly works on a specialized burner system, whereas successful industrial gas salesmen must have knowledge of all the various burner systems and know when and where to apply each to the best advantage of his customer and his undertaking.

Many of our most successful installations are made up of furnaces by several of the well-known makers, each operating in its particular sphere to the consumer's advantage. Our industrial load in Birmingham, specified as gas sold to the factories in the area of supply, is rapidly approaching a figure of 5,000 million cu.ft. annually.

Mr. Pardoe again states in the introduction that a knowledge of furnaces using competitive fuel greatly increases a salesman's prestige. That may be so, but he still has to make the customer believe he is right, as, although we may not like it, we, as industrial gas salesmen, are always looked upon as being biassed in favour of our own fuel. Mr. Pardoe suggests that we have tended to under-rate our competitors. Here again I feel that the statement is totally incorrect, as many of us who have worked through the early stages of industrial gas development have already withstood successfully the onslaughts of more than one competitive siege, and even now are getting ready for a new one. I feel that the increases in gas consumption which can be shown by many undertakings (as mentioned previously) and which, in many instances, occurred during the period of most intensive competition, are sufficient evidence that we have not under-rated our competitors and have every reason to be proud of our achievements. The move to establish industrial centres up and down the country is definitely one piece of evidence that we are alive to competition.

I do not wish any of my remarks to be taken to mean

that I am completely satisfied with progress. When one reaches satisfaction one is finished, and with several points in Mr. Pardoe's Paper I am in full agreement. Gas at the lowest economic rates, both for the undertaking and the consumer, is essential for the future progress of the industrial load, and being in close touch with the prospects of increases in our industrial loads, one cannot but be amazed at the outlook which lies before us. One may say without hesitation that the manufacturer has become gas-minded to a degree that I, for one, should not have thought possible some years ago, and (so far as users of solid fuel and liquid fuel are concerned) is prepared to give us every chance of putting forward sound gas propositions.

Unfamiliar Applications.

Mr. DEAN CHANDLER (South Metropolitan): I want to congratulate Mr. Pardoe on having been able to put before the Meeting some useful but unfamiliar applications of gas to industrial processes. I can say from experience that it is by no means easy to bring forward new examples. This, of course, is due to the fact that gas has already entered into so many industrial and commercial processes that our work is tending to become more and more repetitive and the field for novelty increasingly restricted. Obviously, then, the future will call for higher standards of inventiveness and design if the scope, as distinct from the volume, of industrial gas business is to increase. I am not quite clear on Mr. Pardoe's own views on the training and experience of industrial gas salesmen. He would appear to be quite definite on the need for extensive practical training; but perhaps in his wish to be fair to those who hold other views, he a little later rather discounts his expressed opinion.

Should we not distinguish between the personnel entering into a commercial transaction? There is first the salesman who in the modern parlance of scientific commerce is called the contactor. This sounds rather electrical; but I believe, however, that this is his designation. Then there is the prospect or the man who has to be contacted by a very proper and scientific approach. Then, to complete the trinity (it is only a trinity which is complete), there is the self-effacing industrial engineer whose job it is to carry the baby with all its cares and anxieties. He has the joy of getting the job into its proper perspective and carrying it satisfactorily through. This satisfaction incidentally is usually his only reward.

I am doubtful about the salesman's method of approach mentioned in the Paper. It seems to me that the salesman's primary duty is to obtain the maximum revenue for his employers. If he can obtain business at an apparently high gas price by showing a saving on the old plant, there is no occasion for cutting prices to obtain business against the competition of new furnaces using the fuel which it is hoped to replace. After all, our customers are business men and we are business men, and there is no occasion for running our concerns on other than accepted commercial lines. The aim should be to secure the business on the best terms possible in the circumstances. That "in the circumstances" is the crux of the matter. The industrial salesman has to be a man of rather more than average salesman's intelligence, as he has to exercise considerable tact and judgment in finding out and assessing those "circumstances," which will give him the pull to obtain reasonable price for his fuel. I am afraid that easy, "cheap gas" might lead to reliance on the less efficient types who could sell anything, if they could give it away.

Let me make my meaning clear. We have recently obtained orders for two furnace sets. One is a battery of burners which will encircle welded steel drums 45 ft. high, 11 ft. 6 in. diameter, 1½ in. thick, weighing about 45 tons, and will be used for normalizing the horizontal welds at 800-850° C. This will take gas at about 27 therms an hour. The other is a furnace 22 ft. long by 11 ft. 6 in. wide by 10 ft. high, to the spring of the arch and is to be used for annealing fabricated heavy engineering materials. This will take gas at about 42 therms an hour. In neither case would any other source of heat be so convenient—solid fuel would be impracticable—and the acceptable price for gas does not, therefore, come into the "cut price" range, which is usually considered necessary for jobs of this scale. A third instance is a very elaborate gas-fired plant at Elstree for testing the fire-resisting qualities of builders' materials. You will gain some idea of its size when I tell you that the gas service installed is an 8-in. pipe. In this example gas is the only suitable fuel and a reasonable price is therefore obtained.

Arriving at the Price.

Finally on the question of gas prices, I think we should be careful in arriving at our charges. The final question must always be "Is it economic for us"? If it is not economic we should be better off without the business, as electricity undertakings are tending to find with some of their artificially created special loads.

I am wondering if too much is not made of the "bright annealing" business. I think the amount of this work is comparatively small compared with the less exacting reasonably scale-free annealing work. Are we to some extent being deluded by a phrase? There are such things as catch-phrases and fashions even in industry. And an article which is bright to one manufacturer is not bright to another. However, there is this to be said—whatever the electric furnace can produce can also be obtained from a gas-fired furnace. As pointed out by the Author, it is the atmosphere which is the kernel of the problem, and electrical equipment more often than not employs an atmosphere which is prepared from town gas. I may say that for four years a firm of wire-drawers in South London bright-annealed large quantities of copper wire in a battery of "Barcro" type gas-heated furnaces with perfect results using low-sulphur content coal gas as the purge. Mr. Pardoe remarks that by research the Gas Industry could have secured a monopoly in bright annealing but this is by no means clear to me. However, it is gratifying to note that the cause is not wholly lost, as the "flight from electricity" has begun.

I wholeheartedly agree with Mr. Pardoe on the value of a number of smaller consumers as against one large one. In this connection I should like to ask if he could give us any information about the big firm whose removal caused his 1933 slump. This firm is obviously a valuable one to the local Gas Company, and I wonder if the undertaking to whose area it has moved is benefitting to the full from its acquisition.

Lastly, the 125 per cent. increase in the use of gas by electrical manufacturers is interesting. Perhaps Mr. Pardoe could give us some details on the nature of this business. Do their products go mainly into heavy electrical industries or are they coming out to compete with our domestic sales? I think Stretford is to be congratulated for its enlightened policy and enterprise in giving the closest attention to the industrial aspect of gas sales. Col. Carr and those working with him are doing much to help the Gas Industry to secure its rightful heritage in the industrial field.

Dr. A. FELLS (Sheffield): The section of the Paper in which I am most interested is that dealing with the bright annealing of copper, since, as Mr. Pardoe points out, the bright annealing of non-ferrous metals has been given considerable attention by us at Sheffield, and is at the moment the concern of a Technical Sub-Committee of the Joint Co-ordinating Committee. The outline of the process described in the Paper as being capable of fulfilling the desired conditions of a bright annealing plant is very interesting, especially the re-circulation of heated purging products both for supplying the necessary heat to the work in the muffle, and for maintaining the necessary chemical conditions during heating and cooling.

It would have been of added interest had Mr. Pardoe been in a position to tell us something of the type of gaseous atmospheres he proposes to use as his purging medium, especially if this is prepared from town gas.

The efforts being made by various gas undertakings in this highly important field of industrial application of town-gas—the prevention of surface damage to metals during heat-treatment have already shown great possibilities—and there are to-day very definite indications that the bright annealing of non-ferrous metals is no longer the monopoly of the electrically-heated furnace.

The problem of prevention of surface damage to metals, generally referred to as atmosphere control, has in the past been made to appear like some form of magic, and has been developed and marketed in such a manner that much of the true chemistry of atmosphere control processes has been hidden in a maze of commercial selling points. Let me explain just one item which has caused a good deal of controversy in the bright annealing of non-ferrous metals, that is the problem of the sulphur content of the purging gases used to prevent metal surface damage. It is almost universally believed that such purging gases must be as free from sulphur as possible and nearly all atmosphere control processes on the market for use with non-ferrous metals have been designed to give this freedom from sulphur. Processes used in electrically heated furnaces almost invariably give sulphur-free purging gases, either the initial source of the gases being naturally free from sulphur, as in the case of cylinder ammonia, or some stage is incorporated for the removal of sulphur if it is present in the initial source of supply. The electrical furnace people have fully realized that freedom from sulphur is absolutely necessary, but *not* for the sake of the metal being bright annealed. It is primarily to prevent damage to the nichrome heating elements of the furnace itself that freedom from sulphur is desired.

It appears to have become popular belief that any atmo-

sphere control process for use with non-ferrous metals, to be successful, must give a sulphur-free gas mixture, but it has been shown in practice that many non-ferrous metals, such as copper, gun-metal, cupro-nickel, standard silver, and phosphor bronze, can be perfectly bright annealed in the products of complete combustion of a normal town gas without any sulphur being removed.

Also, there is no necessity to condense the water vapour content of the products of combustion, and so ordinary in-flame type gas-heated furnaces of simple form can be used, and have been used successfully in the Sheffield area for some two or three years, for the bright annealing of non-ferrous metals. Some furnaces using this principle, with no muffle, have a water quench, others can be dry quenched by using the cooled products of combustion, but in no case is the sulphur removed. It is very apparent then that it is a simple question of economics. With town gas as fuel, and using a furnace of appropriate design for the cooling stage, the cost of bright annealing the non-ferrous metals before mentioned is confined to the cost of heating the metals. No costly external supply of dry sulphur-free purging gases is required.

I do not propose introducing any further technical points, but I do wish to emphasize the fact that very much greater use can be made of town gas in the field of bright annealing of non-ferrous metals than has been made up to the present. As Mr. Pardoe rightly states, "the flight from electricity has begun" for the simple reason that it has been shown to be unnecessary to install expensive electrical furnaces with their complicated and expensive atmosphere producing units. Town gas can provide the heat and the desired control of atmosphere for the bright annealing of many non-ferrous metals at one and the same time.

Plea for Simple Open Type Furnace.

I do not agree that the load for bright annealing should be belittled, but some of the speakers this morning have tended to belittle it. Any load is important if it interests any particular gas undertaking. I should like to urge that furnace manufacturers should try a simple form of open type gas-heated furnace, merely using the products of perfect combustion as the source of bright annealing gases. Admittedly we have not a big load for bright annealing in Sheffield, but we have what load there is, and we have had successful furnaces. The chemistry is simple, and I believe that if only we can persuade the users of gas who require to bright anneal metals that the products of combustion of the fuel they use to heat the furnace will bright anneal, this subject will be no longer regarded as magic.

I have been asked to mention the subject of "clean" or "scale-free" annealing. This is scarcely the time at which to go into a lot of detail about the difference between "clean" annealing and "bright" annealing, but in my opinion clean annealing is probably as important as bright annealing. Most of the non-ferrous metals are perfectly satisfactory for their subsequent processes and for putting on the market in the clean annealed condition—*i.e.*, they are not mirror-bright or as bright as when they went into the furnaces, but they are to all intents and purposes clean, and remarkably free from scale and surface damage. Recently I have had some experience with a big electrical furnace for the bright annealing of nickel silver; it is a cracked ammonia furnace. (We have heard such a lot about bright annealing in electrical furnaces using cracked or partially cracked ammonia.) Every piece of nickel silver that is so-called "bright-annealed" in that furnace has to be acid pickled. I grant that after that it is bright, and the time of picking is short. The metal as it leaves the furnace is clean and is not badly damaged, but it is not bright. We can obtain precisely the same result with the ordinary open type gas-fired furnace of the kind I have mentioned, with a metal containing zinc. Let us have clean annealing by all means, and if we must pickle, let us pickle. But I do want to emphasize that in my opinion the furnace makers would be doing us a service if they would put on the market a furnace of the type I have mentioned; and when we hold our next Annual Meeting we shall be able to go further than Mr. Paddoe's statement that "the flight from electricity has begun."

From a Different Focal Centre.

Mr. FALLON (Incandescent Heat Company): Naturally, as a manufacturer of industrial furnaces, I look upon the subject under discussion from a focal centre different from that of the gas engineer. I was very interested in Mr. Pardoe's Paper because in it he has made some favourable comments about the members of my industry. I was reminded of a statement made by the late Mr. Woodrow Wilson (who was President of the United States of America) many years ago, when speaking of the yellow races, to whom he referred as men of "the meaner sort." Until a few years ago I felt that the men in the Gas Industry had looked upon the industrial furnace manufacturers as men of the meaner sort, or men making the meaner sort of apparatus! But I notice that in the early part of Mr. Pardoe's Paper we are granted the justifiable prefix "reputable." Gas salesmen, of course, have to deal with many problems outside the range of industrial furnaces, but I do say that if we were to follow somewhat the lines adopted in America, where the furnace manufacturers throw open their factories to the young students and young salesmen in the Gas Industry, and welcome them to those factories to spend a few months of the year, it would redound to the good of the furnace manufacturing industry and to the Gas Industry generally. My firm ranks as one of the largest in Europe and would welcome such means of collaboration.

The Author of the Paper has stressed the importance of a knowledge of furnaces and fuels. In the course of some 30 years' experience of furnace work in this country, on the Continent, and in America, I have appreciated that in order to be able to secure orders for furnaces and for the fuels which supply those furnaces one needs a thorough understanding of the products to which the furnaces are applied. The right way in which to attack industrial furnace problems is to work back from the product to the furnace and from the furnace to the fuel; then you have a fair chance of success.

In Part II of the Paper the Author refers to the relative costs of fuels, and says there is very little chance of obtaining business with furnaces using gas at from 6d. to 10d. per therm in competition with furnaces using other fuel at a cost equivalent to from 3d. to 5d. per therm. But in Part VII he refers to the electrical Top Hat furnace and mentions electricity at a cost equal to 1s. 2½d. per therm. Surely, if the electric furnace people can sell their furnaces to use electricity at the equivalent cost of 1s. 2½d. per therm, and their furnaces are costing on the average at least three times as much as gas furnaces for a similar duty, the problem of fuel cost does not enter seriously into the matter. Furthermore, I cannot accept the view that "the flight from electricity has begun." From my own knowledge of the electric furnace industry in this country—I am only making a rough guess and have not exact figures—I should say that not less than a quarter of a million pounds worth of electric furnaces of the heat-treatment type are being sold in this country every year. Assuming the value of the furnaces to be £10 per kW., that equals 25 kW. per hour, or roughly, 1,000 therms per hour; on a 3,000-hour year, that means 3,000,000 therms, or the equivalent of 6,000,000 therms in gas. I know a single electric furnace manufacturer who has spent £25,000 this year on extensions, and I am sure he does not think that the flight from electricity has begun; I think he believes that the flight "to" electricity is in force.

Knowing What Not to Attempt.

One of the fundamental needs on the part of one concerned with furnace work is to know what not to tackle; I believe that at times it is well to leave some of the problems to more optimistic and less experienced competitors in other industries—if you wish to defeat those industries! It is quite true, as Dr. Fells has mentioned, that a gas atmosphere is essential in an electric furnace; otherwise it will have an atmosphere of hot air, which is very detrimental to many products.

I consider that the collaboration between the furnace makers and the gas undertakings is most essential. At the British Industries Fair meeting I mentioned that for every £1 of capital expended on industrial furnaces using gas a revenue of 30s. per annum goes to the gas undertakings, as an average. My own Company, in 1914, had 3 or 4 per cent. of its business in gas furnaces, but now the business in gas furnaces amounts to about 45 per cent., which is a very satisfactory increase; we build all types. We prefer gas because the problem of construction of the furnace is less, it provides its own atmosphere and it is ideal in every way; so that it is of the greatest importance to us to collaborate closely with the gas undertakings; we have had very effective collaboration with the leading undertakings, such as the Gas Light and Coke Company, the South Metropolitan Gas Company, and others, and we appreciate the great work which Dr. Fells is doing in Sheffield on the question of gas atmospheres. But the representatives of the gas undertakings do not come to our works as often as they should in order to see what we are doing—and we are spending some thousands of pounds a year on research. Bright annealing, about which so much is being heard lately, is being re-invented; it has been in operation for many years, and I estimate that the amount of bright annealing in this country exceeds 20,000 tons a year; yet very little is said about it. But if somebody does a little bright annealing in a tube it is advertised all over the country.

The CHAIRMAN intimated that there was not time for further discussion of the Paper, and that Mr. Pardoe would make his reply in writing.

(Communication No. 134)

Gas Safety Precautions

by

C. A. MASTERMAN

(Chief Technical Officer, Gas Light and Coke Company)

Dr. H. HARTLEY (London): It is indicated in the Paper that of the accidental deaths debited to the Gas Industry just under 1 in every 10 was attributable to products of combustion. About 77 per cent. of the accidents were due to escapes of unburnt gas, and in this category 1 in 50 was attributed to the appliance itself. On the whole, therefore, the gas-consuming appliance shows up very well in Mr. Masterman's analysis. Of the accidental deaths, 73 per cent. were due to unburnt gas arising from "Taps left on or mistaken." Whatever type of tap we supply, no doubt we shall still have cases of mistaken use, but something can be done to effect improvement by the extended employment of taps of the so-called "safety" type, and the additional cost involved is not excessive. When any radical change in design in gas appliances is introduced it is especially important for those responsible to try to ensure that the modification will not decrease the safety factor. We had paid particular attention to this point when introducing the bottom-flue-outlet oven construction in 1923, and I am glad to find Mr. Masterman now able to attribute the large decrease in explosions in cooker ovens in part to the more general introduction of the bottom flue outlet, together with the use of the safety type tap.

The factor of safety in the use of town gas is really very high, and in the natural course of events progress in the future will increase that safety.

The Author's summary aptly states the position: "The Gas Industry must accept and pursue its responsibility for ensuring to its consumers satisfactory service from the gas appliances in use, *a service which must extend far beyond the elementary need for safety.*" I am sure all endorse that view, and the efforts of the Industry will be applied in the future to ensure even more satisfactory service. It does behove us, however, to make quite sure that any steps which we take for the extension of our activities are really for the good of the Industry. Shall we progress best if we introduce a rigid national system of test and "approval"? Or are we to continue as in the past by the method, more in keeping with our national character, of developing by evolution? I prefer the latter method with the spur of competition and am glad to find the Author later states: "Rigid regulations tend to cramp development, to cause makers to design to the *lowest* acceptable standard, and to breed a false sense of security in all those who make contact with an appliance or fitting which is stamped as having been approved."

Combustion Standards.

Let us consider the question of combustion standards. It was, I think, early in 1927 that we issued the brochure entitled "Hygienic Standards of Gas Apparatus," in which was put forward the first suggestion that standards of combustion should be specified for appliances in order to ensure that under conditions of use combustion would, for all practical purposes, be complete. We recommended that hygienic standards should be based on the CO/CO_2 ratio for the products. Hygienic standards are now in force in this country and abroad, and the CO/CO_2 ratio has been adopted by common consent as the criterion for completeness of combustion. Many of the larger gas undertakings now require that the products of combustion from apparatus shall give a CO/CO_2 ratio not exceeding 0·01 at 100 per cent. pressure overload, while a ratio of 0·02 would still leave an ample margin for safety, and has in fact been proposed as a national recommendation in another quarter. As appliance manufacturers, we make it our aim to design to a CO/CO_2 ratio of 0·005 at 100 per cent. pressure overload wherever possible. Now if it were rigidly laid down that all apparatus must conform to some standard, the immediate effect would be to produce a falling-off in quality. I can assure you at times even at present there is a great temptation to relax our 0·005 standard when one knows that the gas undertakings will accept 0·01, and that 0·02 would be quite good enough. Technical staffs are pressed for release by production or sales people who are anxious to get on with the manufacture of a new appliance. It is so fatally easy to say: "Oh well, the Gas Company will accept 0·01. Let it go." At present one can resist such pressure. If a national standard were enforced we should have to work *down* to it. At present good results are attained with the consent of all parties concerned—it would be a step in the wrong direction to try to enforce any standard. Much more can be done always by persuasion than by compulsion.

The position in regard to products of combustion from appliances made by reputable manufacturers, so far as safety is concerned, is almost beyond criticism. In fact, the safety standard is so high that I am somewhat afraid liberties may be taken which will ultimately lead to criticism of the Industry as a whole. To paraphrase the Author's summary: *The Gas Industry must ensure to its consumers satisfactory service from the gas appliances in use.* Now what is meant by "satisfactory service"? We are not giving satisfactory service if we recommend the use of apparatus under conditions which will lead to criticism on the score that the gas products are objectionable.

As an Industry we are extending the use of flueless heaters. If one were concerned only with questions of safety it would be permissible to burn gas fluelessly in many circumstances, to the extent of 1 cu.ft. of gas per 50 cu.ft. of space. In the majority of cases with the town gas supplied to-day I should hesitate to agree to burn more than 1 cu.ft. of gas in 150 cu.ft. of space, because I feel that to many people the sulphur products would be noticeable and objectionable. We do not want to approach the use of flueless appliances from the point of view of what is safe, we should always concern ourselves with the wider question of what is desirable. Again, if you have freely-burning flames you can permit of pollution of the atmosphere, to an extent which would rarely occur in practice, without danger of emission of carbon monoxide in any quantity. When, however, the flames are not burning freely, and there are many pieces of apparatus in which they do not burn freely, the position is not so satisfactory. For example, with certain radiant heaters which in an unpolluted atmosphere give a CO/CO_2 ratio of 0·002 *at normal consumption*, we have found that the ratio increased to 0·01 when the CO_2 present was 40 parts per 10,000, to 0·02 when the CO_2 present was 80 parts per 10,000, and to 0·05 when the CO_2 present had risen to 1 per cent. Now with one air change per hour a CO_2 concentration of 40 parts per 10,000 would result from the continual burning of 1 cu.ft. of gas in 125 cu.ft. of space, an amount which would be insufficient thoroughly to heat an ordinary room in really cold weather. I want to draw the attention of the Industry to the need for exercising care in the extension of the use of the flueless appliance. Certain types of flueless gas heater should only be used for local or directional heating. If you do flueless heating with sulphur-rich gases you may bring the Industry into disfavour and cause irreparable harm, while if you use apparatus unwisely you may wipe out the exceptional factor of safety we enjoy at present.

General Testing Practice.

In section (7) Mr. Masterman states the general testing practice; that is, to examine ungoverned appliances at 100 per cent. pressure overload and governed appliances at only 25 per cent. gas rate overload. I am not satisfied that this lowering of the overload requirements should be allowed when the apparatus is supplied with a governor. As high a combustion standard is demanded for appliances fitted to flues as for those which are used fluelessly, and I venture to think that the provision of a flue is at least as useful as the provision of a governor, at any rate of the volume type. Unless I am misinterpreting the Author, it would appear that with a governed appliance he would in fact not really demand any overload capabilities. In the Paper he states: "If the appliance is to be fitted before issue with governor and fixed orifices . . . the consumer can conveniently be given more reliable service which at the same time is fuller in that the gas rate can be increased to 25 per cent. in excess of that otherwise allowed." That sentence does seem to me to imply that he would suggest fitting the apparatus to work at its overload. If so, what about variations in gas quality, the effect of corrosion deposits and the like, and variations between the sample tested and bulk deliveries? I should be very glad if Mr. Masterman would deal with this point in his reply.

With regard to the fixed orifice injector, before this device could be standardized for general use throughout the country, much will need to be done to ensure uniformity in the quality of the gas supply. From the tech-

nical point of view the fixed orifice possesses definite advantages. With it generally better injection of the primary air supply is attainable, but under present-day conditions I do not think any gas appliance manufacturer could meet the demand to supply all Gas Companies with appliances with fixed orifices. With the existing variations in density and calorific value the multiplicity of special nipples which it would be necessary to stock, and the complications which would be involved in manufacture would be such as to make production a veritable nightmare. Then again, from the gas supply point of view you have to consider the possibility that in the future you may want to make changes in the gas you manufacture.

Classification of Accidental Deaths.

Mr. W. J. A. BUTTERFIELD: Reference is made to the Report to the Board of Trade of the Departmental Committee on Deaths from Gas Poisoning, 1930; but I should like to refer also to a report which I made to the Board of Trade in 1924. In it I attempted a classification of the causes of accidental deaths, somewhat similar to the classification given in Part III of the Paper. In my classification, which covered a period of 21 months immediately preceding the presentation of my report, the possible suicides represented 18 per cent.; I note that Mr. Masterman puts the possible suicide figure as high as 25 per cent. There is not much want of agreement in that. In Mr. Masterman's classification unburnt gas is given as responsible for 77 per cent. of the accidents; my figure was 78 per cent. To products of combustion he attributes 9 per cent.; in my figure for the 21 months referred to I gave 12 per cent. as due to that cause. The remaining 10 per cent. I gave as unclassifiable. It is when we come to the further sub-division of the fatal accidents due to unburnt gas that the differences arise between Mr. Masterman's figures and my own. According to him, 23 per cent. of those accidents are due to defective pipes, fittings or appliances, and 73 per cent. are due to taps being left on or mistaken. For the 21 months in respect of which I prepared statistics, the fatalities due to defective pipes, fittings, or appliances were 51 per cent. of the whole of the accidental deaths, or 80 per cent. of the accidental deaths due to unburnt gas; so that my figure of 80 per cent. is on the same basis as his figure of 23 per cent. Thus there has been a most remarkable reduction—from something like 80 per cent. to 23 per cent.—and that is an indication of the value of the policy advocated in this Paper, and in the Paper presented last year by Mr. Lacey and Mr. Masterman. I am personally very gratified to see that result, because in my report to the Board of Trade I recommended that the Gas Industry should of its own accord, without compulsion, institute arrangements for the elimination of unsafe gas appliances and for the periodical inspection and maintenance of piping and apparatus on consumers' premises. Those recommendations were not altogether kindly received by the sponsors of the Gas Industry at that time. The National Gas Council, in commenting on my recommendations, made the following statement, which is printed as part of the appendix to my report: "The Council submit that there are no grounds for the suggestion that a material reduction in accidents would have been effected in the past and could be effected in the future by any system of selection, inspection, and maintenance of the pipes, fittings, and appliances installed or to be installed in consumers' premises." Well, it is evident that the Author and those who have been collaborating with him throughout the greater part of the Industry have completely thrown over those views of the National Gas Council held at the date I have referred to, and are really working on the lines of my recommendation, which was not altogether acceptable in those earlier days.

In conclusion, I would say that I do not wish in any way to magnify the importance of such accidental deaths as do occur; in relation to the extent of the use of gas in the country and the number of premises supplied with gas, such occurrences are astoundingly few.

Fundamental to the Continuance of Business.

Mr. DEAN CHANDLER (South Metropolitan): Mr. Masterman's working activities for the Gas Light and Coke Company are, in many respects, similar to my own activities for the neighbour company south of the Thames. I may perhaps be permitted to remark that the subject which the Paper treats is one which has for many years been considered of paramount importance by the Directors of the South Metropolitan Gas Company, who have for long insisted that sound design and scientific construction of gas-consuming appliances are fundamental to the continuance of our business.

You will perhaps pardon a personal reminiscence of more than 25 years ago, when Dr. Carpenter, who was then Chief Engineer to the Company, took me from the works at Old Kent Road and put me in charge of a well-equipped, experimental laboratory, with the very definite and unmistakable instruction that, in the matter of gas-consuming appliances, the old order must give place to an entirely new outlook. What might have been considered good enough in the past would certainly not comply with the requirements of the future. It was then categorically laid down that each piece of apparatus—starting with the gas lighting unit—would have to be subjected to the closest scrutiny and would have to conform to well-defined chemical, physical, and mechanical tests. The motto from then on was to be "the best and nothing but the best." As a young man I took that admonition very much to heart, and I will let you into a little secret—my best frequently failed to come up to the required standard, and many a time, at the end of a strenuous day, I took my way home just a little resentful that there were people in this world with such high ideals.

Microscopes and micrometers, limit gauges and the rest were the tools and instruments of our day's work, and it was soon demonstrated that the inflexible attitude of my chief was amply justified.

In listening to Mr. Butterfield's interesting remarks I was reminded that for the purpose of the Board of Trade Inquiry, to which Mr. W. J. A. Butterfield has referred, the South Metropolitan Gas Company prepared a 60-page illustrated brochure which described in detail its standard practice. The full title was "Standard Practice of the South Metropolitan Gas Company in the matter of the design, construction, standardization and testing of gas mains, services, meters, piping, fittings, and gas appliances with a view to securing the efficient, economic, hygienic, and safe distribution and utilization of town gas."

Eager to Meet the Industry's Requirements.

The Gas Industry has done well in recent years to direct its energies to this aspect of its business.

I know, only too well, how our friends, the appliance manufacturers, viewed with concern our attitude in this matter, but there is no question that to-day they are as eager as anyone to meet the requirements of the Gas Industry. It is gratifying to know that most, if not all, of the important firms who make gas appliances are now equipped with the laboratories for testing their goods. (I believe some of you will be visiting the works of a well-known manufacturer of modern hot water appliances, where you will see in operation the kind of control which is not only desirable, but essential, for the production of satisfactory goods.) One of the serious problems confronting the Gas Industry is the sale of shoddy appliances. Mr. Masterman suggests that the continuance of their supply to gas consumers seems inevitable. This is regrettable, and The Institution of Gas Engineers or some other recognized body should give this matter the serious attention it requires. Such appliances are a constant menace to the good name of the Gas Industry. It was only in the last few weeks that I was called to a house in South London, where the occupant complained of disturbing effects on using a small gas fire and oven which she had purchased for a few shillings from a West End Stores. You will be able to gather the condition of this abomination when I tell you that I gave the good woman the money she paid for it and took it away with me in order to save her further annoyance and possible harm. As I was leaving the premises with the trophy in my hand the maker of it arrived at the door and saw with dismay the appliance in my possession. It is significant, I think, that he said that it would be worth a considerable sum of money to him to recover it.

As I have said, this is one of the problems which the Industry will sooner or later have to tackle.

Referring to one or two items in Mr. Masterman's Paper, I am glad to note the emphasis placed on the "fixed orifice" principle which we, in South London, have advocated for 25 years or more. I was interested in the remarks by Dr. Hartley on "fixed orifices," but I do not agree with his view that the more general adoption of this principle would meet with almost insurmountable difficulties.

Concerning the use of small pressure governors for individual gas-consuming appliances, I note Mr. Masterman's warning on the effect of gum, a difficulty with which we, in South London, fortunately have had very little trouble. With regard to the use of a governor to maintain a reasonably uniform gas supply pressure, we are inclined to the view that the governor should form an integral part of the meter, and this idea is now being tried out in South London.

There is at least one matter to which I should like to call your attention, which I think is not referred to in Mr. Masterman's Paper. The employment of the right kind and quality of materials for gas appliances is, of course, of vital importance. I refer, first, to the use of brass tubes,

which may be used in gas appliances, and secondly, to the employment of metal gauzes in gas burner construction. Many years ago we were confronted with the occasional sudden failure of the brass tubes of gas fittings. The failure, after months and often years in service, was the sudden splitting of the tube. This matter was thoroughly investigated by our Technical Staff, and the cause of the failure was discovered. The phenomenon known as "season cracking" is now happily a thing of the past, at any rate, so far as we are concerned, as the elimination of the stresses existing in solid drawn brass tubes by a simple low-temperature heat treatment has put an end to the trouble. It may incidentally be remarked that properly tempered copper tubes may be used for many purposes for which brass tubes have hitherto been employed.

Wire Gauzes in the Bunsen Burner.

Regarding the use of wire gauzes in the bunsen type gas burner, we came to the conclusion twenty years ago that its use was undesirable for the reason that gauze of the Davy mesh functioned as a filter for dust and dirt, and, in time, seriously altered the composition of the gas-air mixture. It may be of interest to know that a brochure dealing with American Standards for gas conversion burners stipulates that "gauze should not be used in burner construction."

Mr. Masterman refers to the development of the more stable pilot lights to reduce the already remote chances of accident from unburnt gas or explosion. This is a matter of particular interest to me, as I believe that pilot lights should always be arranged to take full pressure of the gas supply and to have a fixed consumption at this pressure. There should be no by-pass screws which lead to corrosion and faulty service. To reduce still further the possibility of annoyance to the customer, the pilot tip should be of a non-corroding material, such as a steatite. We have for a number of years now been standardizing pilots of this nature.

I must not omit to remark that even to-day gas taps are being provided on gas fittings with the plug in the incorrect position—that is to say, they are so arranged that if the nuts and washers, from some cause, come loose, the plugs can drop, thus allowing the gas to escape.

One other matter occurs to me, and that is that, from my experience, new types and designs of gas-consuming appliances should have a practical try-out on a reasonable scale under their ordinary daily conditions of use for a period of, say, six months, before they are released on a wholesale scale. Our own practice in this matter is to have some of our own employees make such extended trials in their homes. These "lay" tests, so to speak, often bring out facts which laboratory tests have not revealed.

Finally, under the heading "Testing," Mr. Masterman says that the maintenance of these standards must always be of benefit to the Industry at large since, to an increasing extent, suppliers of materials and the like find it in their interest themselves to carry out tests on their products. In this regard, I recall some few years ago a remark by a representative who had supplied us with material we had found it necessary to reject. I expressed my regret that he would have to scrap this material, but, with a merry twinkle in his eye, he indicated that my sympathy was somewhat misplaced, for reasons which I will leave you to guess.

Before I sit down I would like to say that for many years the South Metropolitan Gas Company has considered as fundamental to the satisfactory progress of the Gas Industry the principles underlying the practice which is now in operation under the able direction of Mr. Masterman at Watson House. When I am privileged to visit that monumental institution I am always reminded of the vision outlined to me by Dr. Carpenter many years ago, which we have for long endeavoured to translate into practice.

Of Importance to the Community.

Dr. G. P. Crowden (Reader in Industrial Physiology, London School of Hygiene and Tropical Medicine): I should like first to congratulate Mr. Masterman on having presented details and information of the utmost importance to the community at the present time. There is one matter, which I feel is of interest to both the gas and the electrical industries, which I do not think he has mentioned. I am quite aware that in the commercial field gas and electricity are rivals; but they have a point in common —*i.e.*, when misuse of either product arises the condition of the unfortunate patient is substantially the same—the condition of asphyxia. Inasmuch as there is that common hazard, the two industries should co-operate at least to inform the public how to deal immediately with cases of accident as asphyxia, whatever the cause. Asphyxia may arise from the inhalation of coal gas or fumes from motor cars, or from electric shock, and in all cases the immediate first-aid measures to be taken are the same. A great deal can be done, I think, in the way of preventing suffering and death due to accidents if there is among the public a wider dissemination of information of the necessary first-aid measures. Work of that sort has been of value in the United States in reducing very largely the number of cases of asphyxia due to gas and electricity. I have been informed by Professor Cecil Drinker, the Professor of Physiology in the Harvard School of Public Health, of the data for the years that have passed since the consolidated gas and electrical companies in the United States have jointly conducted a resuscitation service and have educated the public in these matters. The figures are very encouraging, both in respect of the reduction in the number of accidental deaths, and in some cases the prevention of suicide owing to the fact that the resuscitation personnel are quickly on the spot to carry out the work of resuscitation. I do not think the fact that there have been cases of suicide does in any way detract from the necessity for the provision of adequate resuscitation services.

The improvement which has been effected in the United States is ascribed by Professor Drinker to several causes. In one paragraph of his recent Paper he says that, to the improvements in resuscitation work, other factors must be added; he mentions the practical cessation of the sale of untested rubber tubing, increased care in servicing and installing equipment, and increased knowledge on the part of the public of the dangers of leaking gas.

I suggest that every consumer of gas or electricity, and every possessor of a motor car, should be furnished by the gas and electrical industries, and possibly the motor industry and the insurance people, in collaboration, with a small card stating the essentials of the first-aid treatment necessary in cases of asphyxia. We can benefit from the results of the extended investigations made in America and take a few tips from them. I have a small booklet entitled "First-Aid and Resuscitation in Gas Poisoning, Electric Shock, and Drowning," introduced in the United States by the general collaboration of the American Gas Association, the American Red Cross, the American Telephone and Telegraph Company, the Bethlehem Steel Corporation, the National Electric Light Association, the National Safety Council, the United States Army and Navy, the Bureau of Mines, Bureau of Standards, and the Public Health Service. It explains the essentials of first-aid within the space of a couple of small pages or so of pocket size, and there has been a distribution of more than a million copies in the United States. I feel that education in the matter of first-aid is essential, having regard to the increasing hazards of civilization to-day, and that householders would appreciate it.

Attention to Training.

Mr. R. N. LeFevre (Gas Light and Coke): As one who is closely in touch with the training activities of the Gas Light and Coke Company, I should like to endorse one or two of Mr. Masterman's remarks. We do pay particular attention to the training of our men, and we regard it as perhaps one of our most valuable forms of insurance. In my experience of travelling up and down the country, however, I find that very little attention is paid to this important problem in some other undertakings. During the last few years I have had occasion to examine men, and I have been amazed by the ignorance of some of the gas fitters who are now in contact with the public. An example, perhaps, of the standard of knowledge of the gas fitter in one large undertaking is given by the answer that he gave me this year to an examination question. When he was asked how he would measure the pressure from a high-pressure installation with only a 6-in. "U" tube pressure gauge, if the pressure on the supply was about 80-in., he said he would fill the gauge with water, apply it to a convenient point on the installation, turn on the tap very slowly until he had as much as he could get, then turn off the tap, empty the gauge, re-fill it, continue to empty and re-fill it, add the whole lot up, and that would be the pressure! Another man told me that a superheater was one of the most efficient types of water heater! And so on. These are the men we are sending into people's houses, the men on whom we rely to install our appliances in a safe and efficient manner, and I do suggest that the state of things I have indicated must cease. It is only by continual and efficient training, and, as Mr. Masterman has pointed out, by repeated refresher courses, that we can keep the large army of men we have up and down the country *au fait* with a knowledge of their job and render them able to carry out the work in the most efficient manner. Of course, the training and the increased standard of knowledge of the gas fitter has to some extent accounted, during the last ten years, for the remarkable figures referred to by Mr. Butterfield, showing that the number of accidents due to faulty installation and faulty adjustment of appliances has been reduced in that period

from some 50 per cent. to less than 20 per cent. of the total number of accidents.

Reference has been made by Dr. Crowden to resuscitation. A knowledge of resuscitation is given as part of the training programme of all the fitters employed by the Gas Light and Coke Company, and each man has to pass out as efficient in that respect. But they are concerned only with resuscitation in cases of partial gassing, because in the County of London and the environs of London we have such a wonderful public ambulance service that it would be redundant for us to teach fitters complete resuscitation methods. We use the Schafer system, and it is undoubtedly the best. There is no reason for the gas fitter to be a qualified medical man; so long as he can deal with the partial gassing of his mate, that should be sufficient. In the event of a serious accident to a fitter or his mate, or if either become completely unconscious, an ambulance can be secured within a few minutes, and the man is taken to hospital and dealt with properly.

It may be opportune to mention also that, arising out of the Wimpole Street tragedy, the Fire Brigade Committee of the London County Council formed a Committee of all the interests concerned in the County of London—gas, electrical, insurance, and others—and they have in course of preparation a booklet, a copy of which will be issued to every householder in the County of London, calling attention to the hazards that may arise due to the various public utility services. The booklet will be short and concise, and will deal with many of the points which have been mentoned by Dr. Crowden.

Stimulating Improved Design.

Mr. W. W. Townsend (Colchester): The Author stated that the influence of the larger undertakings and the reputable gas appliance manufacturers is continually being exercised to stimulate improved design, construction, and installation of gas appliances, and that those efforts have had a marked effect. I think we should bear testimony to those undertakings which have carried out such work not only for their own advantage but for the advantage of the Industry generally, and I think we owe a great debt of gratitude to the Gas Light and Coke Company in respect of the work which is being carried out at Watson House under the guidance of Mr. Masterman. That work has led to a great deal of the improvement which has been referred to. There is no doubt that there has been a reduction of accidents, that apparatus is more efficient than formerly, and that more is known about the correct methods of fixing, and in connection with all those problems other undertakings have done their share; but on this occasion I think we ought to pay tribute in particular to the Gas Light and Coke Company for making public the results of their work; they gave us a Paper last year and have amplified it by another Paper this year, and the two together form a very complete record of the work that has been done. Those who have the opportunity to do so should visit Watson House and see, as I have done quite recently, the admirable work that is being carried out there, for it is beyond all praise.

I notice that the Author refers to the starting of domestic centres. But I believe they are already formed, and that those undertakings which are already co-operating with the Gas Light and Coke Company in the industrial centres are to be allowed, for an additional subscription, all the facilities afforded by the Watson House organization. That represents a tremendous step forward. I think Mr. Lacey has the largest responsibility in that extension, and our gratitude is due to him for having taken the lead.

I think that the man who invented the plug-in bayonet cock ought to have a monument erected to him, because it represents a very great advance. Then I would call attention to the fact, in case some have not noticed it, that the British Standards Institution has published a Standard Specification for flexible metallic tubing and connections. I am one of those who would like to see rubber push-ons entirely abolished—and a good many other accessories might follow them into the limbo of forgotten things. The specification for flexible metallic tubing and connections will help.

A particularly interesting part of the Paper is that which deals with unsatisfactory appliances in private ownership. The Gas Light and Coke Company, with their usual thoroughness, have now taken in hand the work of improving such appliances and making them safe and efficient; but it seems to me that the weakness is that nothing whatever is being done to prevent further unsatisfactory appliances coming into private ownership, and to prevent the fixing of appliances in an unsafe manner. So far as the Gas Industry has control, all is well; we know what to do and we can do it. The trouble may arise in connection with the 2, 3, 4, or perhaps 5 per cent. of appliances of the kind referred to this morning by Mr. Chandler. He referred to them as shoddy appliances a very good word. Why is the sale of these shoddy appliances allowed? Then there is the further difficulty—although I suppose the gas undertakings as a whole have the matter in their own hands to a very large extent—that there remain still a few people who call themselves plumbers and gas fitters and who carry out installation work. There is a danger now because the speculative builder, in the attempt to reduce his costs to the lowest level, may have shoddy appliances installed by people who do not understand their job. I think it is high time that this Institution did something about that. We pride ourselves on our 73 years of work and we have produced various standard specifications; we have standard specifications for wrought-iron tubing and for refractory materials, but we have never yet produced a specification for gas fittings. I do not consider that this fact is a credit to the Institution. One of the features of the Paper is that, notwithstanding the Author's objection in some places to rigid specifications of standards, he suggests that one of the first duties of the Domestic Gas Appliances Committee should be the drafting of model regulations of a general nature regarding gas equipment. So far, so good; after 73 years we are beginning to move, and I hope that when these draft regulations have been produced they will be adopted generally.

I should like to point out to the Author that he is a little inconsistent. In one part of the Paper he states that rigid regulations tend to cramp development (when dealing with apparatus); in another he states that the results of maintaining a rigid standard diminish the amount of defective material reaching the district. He cannot have it both ways, first rigid and then flexible. I suggest that, if rigid inspection and rigid specification prevent unsatisfactory material reaching the district, the more rigidity we have, the better. In the Paper presented jointly last year by Mr. Lacey and Mr. Masterman, and also in the present Paper, the general recommendation in regard to appliances is against any rigid standard of performance. That has been approved by Dr. Hartley and others who are far better qualified than myself, but I must confess that I am still somewhat unrepentant and that I do not see why, after the Institution has been in existence for 73 years, the Gas Industry should not do something on the lines of the action taken by the London and Counties Coke Association within three years. That Association found that a great deal of harm was being done to the coke industry by the installation of unsuitable appliances, and they set to work to get those appliances off the market. To a very large extent they have succeeded, in three years. In order to assist in that direction they went to the British Standards Institution and secured the adoption of a British Standard Specification for the minimum size of domestic boiler. It does not mean that every boiler is tested and stamped, but it means simply that there are minimum standards to be observed. One of the things the Association did was to try out all the types of coke-burning appliances on the market and to make a list of them; you will find in their publications a list of approved appliances, and any builder or architect or anyone else concerned with the use of coke can find out the views of the highest authority on the subject. I think it is about time the Gas Industry followed that example with regard to gas appliances.

(Communication No. 135)

PRODUCTS OBTAINED BY THE Carbonization of Scottish Cannel in Continuous Vertical Retorts

by

JAMES JAMIESON

(Engineer and Manager, Edinburgh Gas Department)

and

J. G. KING

(Chief Chemist, Fuel Research Station)

Both Mr. Jamieson and Dr. King briefly introduced the Paper.

Dr. KING, in the course of his introduction, said: I should like to refer to the unfortunate paragraphs which have appeared in the public Press regarding the national aspect of this problem. Mr. Jamieson and myself have not attempted to deal with that in the Paper, and we have been very careful to refer all our conclusions to the particular cannel coal which we have examined. It is difficult to estimate the extent of the application of this process in the Gas Industry. Edinburgh is in a favourable position. Other undertakings will have to find their own sources of cannel coal and perhaps take advantage of this work.

Discussion.

Mr. F. B. RICHARDS (Woodall-Duckham Companies): I think we are very much indebted to the Authors for a most interesting Paper which is packed full with a mass of information, most of which we certainly should not have come by in any other way than by the method which has here been followed—*i.e.*, a piece of joint research work undertaken by an industrial concern in conjunction with the Fuel Research Station. To my mind that is a feature of very special and outstanding importance. The operations of the Gas Industry cover, as we know, a very wide field and at nearly every point of our operations we find ourselves brought into contact with, and indebted to, the work of the Fuel Research Station. The survey of coal with a view to the assessment of its usefulness for the purpose of our Industry is a work which has been of the utmost value to us. The subject of this Paper embraces rather a new aspect of the matter inasmuch as few of us would, in recent times, have looked upon cannel as a very interesting material from the point of view of gas supply; but as Dr. King has pointed out, it is necessary in assessing the commercial significance of this work to have in mind the availability of cannel of the type that has been treated in this Paper, and it would be a matter of great interest to the Industry in general if some more information could be given us in due time as to the extent to which cannel of this type can be made available, and it will then be possible to see how far intermediate types of cannel would be commercially available for similar treatment. If any of us had been told that a commercial grade of this coal purchased at 23s. 6d. a ton could be obtained in this country and would give 120 therms of town gas, 40 gal. of low-temperature tar and 4 gal. of motor spirit as well as 7 cwt. of satisfactory coke, I think we should have been a little sceptical, but our eyes have very distinctly been opened as to the possibilities. The results are certainly attractive but the availability of the material is all-important.

A point which struck me as very interesting is the magnification, as it were, by the tests here recorded, of something that has come under the observation of all of us and that is the great significance in vertical retort practice of the porosity of the charge. Treating a coal which causes the gas to travel in contact with the walls of the chamber, as we all know, produces phenomena very different from those which are observed when the porosity of the charge enables the gas to travel freely out of contact with these walls, and I think these tests bring out the importance of that feature very strongly. It is interesting to see that with temperatures the same in each case—namely, 900°—in the assay test but by varying the temperature of the cracking surface in the apparatus, the tar yield is doubled by reducing the cracking temperature from 800° to 650° and that, to my mind, opens up or rather lays stress upon the importance of further work being done following the work which has already been reported to the Institution on the significance of cracking and the conditions under which it is carried out. The hydrogenation tests on tar, again, are of the utmost interest and the products producible cover such a wide range that if the supplies of material were commercially available on a sufficiently important scale, this clearly is a very momentous thing for the country. The big " if " is the one we should like to hear more about.

I would like, as one engaged in industry, to bear my testimony to the value of the open door at the Fuel Research Station, where we can all go whenever we feel so inclined and discuss our technical problems, and I would like to express, as one who has benefited thereby, my great appreciation of that privilege.

The Value of Co-Operation.

Mr. T. CARMICHAEL (Portsmouth): The introduction to the communication, which describes the arrangement of co-operative investigation of the three programmes agreed, provides the Institution with another instance of the value of such co-operation. In this instance the co-operative researches have been carried out by

(1) Mr. Jamieson and his Works' Staff at Granton Gas-Works,
(2) Dr. King, of the Fuel Research Station, aided by
(3) Mr. Finlayson, representing the Woodall-Duckham Companies.

The first investigation, which is the subject of this communication, would not appear to be of such general interest as the two which follow and deal with the development of and improving the quality of coke and increasing the yield of benzole. On the other hand, the carbonization of cannel, although only of a more or less local interest to Scotland, renews contact with a former practice, which has become obsolete, under conditions which have arisen to make it a possible remunerative revival. To jump to conclusions for a moment, it would seem that any practical and economic value which may be the outcome as proved by the investigations, is due to the subject of the conclusions—viz., that the coke residue from the carbonization of cannel is now found suitable for closed stoves and open domestic fires, and that profitable " stripping " of the gas and hydrogenation of the tar are now possible.

The greater variations, however, in the properties of cannels than those obtaining in the case of ordinary gas coals and their comparatively higher (4s. 6d. per ton) and perhaps more irregular prices, would, no doubt, operate unfavourably in the matter of their adoption for regular practice, but where these conditions can be favourably arranged, there seems no doubt as to the economic value of the carbonization of cannel coal.

The Authors are to be congratulated on the arrangement and carrying out of the carbonizing tests which were on such a scale as to yield practical working results as given in the comprehensive Table. These results are remarkable in their consistency with normal vertical retort practice, the differing values in the product merely varying with the analysis of cannel as against coal. The results of Test " F " undertaken after repairs to the test retorts, which were showing leakage in 1935, are rather surprising. It is noted that only the calorific value of the gas and the tar yield seem to have been affected, and, contrary to expectations, the thermal yield of gas per ton was unaltered. The thermal value of the increase in tar yield appears to be 5·7 gal. of specific gravity approximately 1·0 and 17,600 B.Th.U. per lb. or a little more than 10 therms per ton of cannel carbonized.

Steam Determination.

I do not think the determination of the amount of steam used in steaming the charges is clearly stated by the Authors. Although condensed overflow from the bottom seals was weighed, it is not mentioned that any correction of the steam meter readings was made, nor any correction for moisture in coke. The moisture in 30·7 per cent.

steamed cannel coke, compared with that in 8·6 per cent. steamed coal coke—viz., 6·1 and 1·2 respectively—seems to indicate that condensation has an appreciable effect on the gross or net steam figure.

The recovery of benzole or spirit from the gas is an asset comparable with similar recovery as practised at many works to-day. It is noted, however, that the composition and nature of the spirit recovered, especially in the matter of aromatic hydrocarbons, prevents it being sold through the medium of the National Benzole Association; but it is fortunate that the high content of unsaturated hydrocarbons assures a satisfactory octane number and its suitability as a motor fuel.

With regard to the residual coke produced from the cannel under investigation, this is apparently satisfactory in composition and combustibility, and as the general size coincides with that required for small closed appliances and the newly-developed gas-ignited open domestic coke grate, it is an economical product. The comparison with a standard low-temperature coke would have shown to better advantage had a high-temperature coke been used and would, I think, have been more appropriate and useful to the Gas Industry.

Cannel coke as a producer fuel and as fuel for water gas plants shows to advantage in the former and quite satisfactory in the latter, as against coke from bituminous coal. Its size might have been expected to adversely affect such usages, but no doubt Mr. Jamieson will tell us if higher primary air or blast pressures took care of this difference.

Next to the size of cannel coke, the quantity, physical characteristics, and composition of the tar produced have hitherto been the most disturbing features of the carbonization of cannel, but the use of continuous vertical retorts and the possibility of the application of hydrogenation may render the tar a valuable product. In any case, the net cost of gas production from the cannel used appears to be less than that from normal Scottish coals, and, as stated, much more so if the possible enhanced price for tar is obtained.

In conclusion, it would be interesting to see if our friend, Mr. Jamieson, decides to recommend his Undertaking largely to adopt the use of cannel on the strength of the findings of this investigation and in view of the good results already indicated. I am rather of the opinion that the buying price and supply of cannel is not sufficiently stabilized to warrant such a course being adopted.

No Unsubstantiated Claims.

Capt. W. H. CADMAN (Anglo-Iranian Oil Company): Having read the Paper very closely and carefully, in my opinion the Authors make no claims which are not substantiated by experimental fact. Dr. King has expressed regret at the somewhat garbled versions which unfortunately have been broadcast throughout the country, which gave deductions of a nature that were quite unfounded and were not only misleading but did the Authors and the Gas Industry a gross injustice.

I would like to deal briefly first of all with what, after all, is the crux of the question—*i.e.*, the distribution of good cannel in this country. The Authors request that the fullest investigation should be given to this important point, and if you will allow me I will briefly refer to what investigations have already been made.

The distillation of cannel goes back, of course, to the very earliest work in carbonization. Dr. James Young, when the supply of natural oil from the pit in Derbyshire was running short, turned his attention to other sources of supply. He had the idea that the natural oil was in some way associated with the coke and naturally he experimented on the distillation of bituminous coke and obtained a tar from which he was able to get a fraction suitable as a substitute for kerosene. He also distilled the cannel which was met with in the coal mines in that district and obtained a larger yield of oil. Later on he distilled shale, and hearing there was an ample supply of shale available in Scotland he moved into that district and gave birth to that important industry, the Scottish shale oil industry. I would just point out that in the course of his work he was the first to take out a patent for a low-temperature carbonization process. Dr. Young distilled cannel and, following that, the distillation of cannel for oil in this country spread rapidly. In the Memoirs of the Geological Survey, a Special Report on the Mineral Resources of Great Britain, Vol. VII, published in 1920, there is a special chapter which gives a description by counties of the work that was done on cannel at that time. Suffice it to mention that in 1865 there were no fewer than 154 retorts distilling cannel in North Staffordshire, 22 in Flintshire, and many in the other counties and in Scotland, which are referred to. All these were primarily distilling cannel for coke for oil. In 1871 the report of the Commission appointed to enquire into several matters relating to coal mentioned that the low price of the oils sent over from America destroyed a considerable section of this trade and nearly all the cannel coal then raised was used in the manufacture of gas.

Now to come to more recent times. During the later stages of the Great War the utilization of cannel and cannel oil substances associated with the coal seams was again brought under discussion as a possible source of oil by the Ministry of Munitions of War. A large number of samples were collected and a very thorough enquiry was made at the various collieries in which cannel and cannel oil substances existed, and attempts were made to work the cannel in the various localities.

A Ministry Enquiry.

The results of this enquiry are set out in the Memoirs I have just referred to. Briefly, the conclusion arrived at was that the main cannel in England and Wales—I notice that Scotland is not mentioned in that conclusion—is not regarded as a sound commercial proposition except so far as regards small quantities that can be separated cheaply and used for special purposes, such as the enrichment of gas, the reason being that it was found—as very definitely stated by the Authors of the present Paper not once but several times—that cannel is a very elusive substance. You may start with a seam 2 ft. or 3 ft. in thickness and then it thins out in a few yards to nothing. It is absolutely impossible to make anything like an accurate estimate of the available quantity in any locality as your raw material. That has been the case in all the investigations which have been made in trying to form an opinion as to the quantity of cannel that exists in this country.

The most recent investigation in connection with these oil-yielding cannels and similar materials was that started in Scotland by the late Professor Briggs, Professor of Mining at Edinburgh University while Chairman of the Oil and Coal Committee of the Scottish National Development Council, and Professor Briggs personally supervised this investigation. I think he succeeded in getting a grant from the Commissioners for Special Areas in Scotland, and he also had the co-operation of outside collieries. A large number of samples were collected of the oil yields determined in this connection. I had the pleasure of collaborating on many occasions with Professor Briggs, and I have a sample here in my pocket, which he was very proud of, of a cannel obtained not far from the district referred to in the Paper and which was used in the experiment. It yielded 81 gallons of tar to the ton, but unfortunately, as in the case of these other counties, the quantity is extremely limited. At the same time, I do not suggest for a moment that the fullest possible use should not be made of such as can be obtained economically.

The Line of Attack.

I should like, in conclusion, to make a comment on the general line of attack in this Paper. As I see it, the Chief Engineer of the Edinburgh Gas Department and the Director of Fuel Research found a problem upon which an attack could be made, the results of which would be of value not only to the Edinburgh Gas Department, but to the carbonization industry as a whole. It is known that the Fuel Research Station is equipped with plant in which experiments can be carried out on a large scale, but, when possible, opportunities are sought for experiments on types of industrial plant. The Edinburgh Gas Department has available a unit of plant of considerable magnitude on which accurate experiments were possible, and the Director of the Fuel Research Station was able to extend the investigation by doing work which could only otherwise be carried out at the Fuel Research Station. I refer to the hydrogenation of the tars and the examination of these products, particularly in so far as they might be useful for the production of motor spirit, Diesel oil, and lubricating oil. I was rather surprised the Authors said they obtained nothing in the nature of a lubricating oil fraction in the crude material, because the cannel tar is more closely allied to shale oil than to ordinary tar from bituminous coal, and from a shale oil it is definitely possible to obtain lubricating oils. In fact, for some considerable time a spindle oil has been made and marketed, and should the necessity arise it would be possible at once to switch over and obtain even heavier types of lubricating oils from shale oil or, I should imagine, seeing that the tar from the cannel is of a more paraffinoid nature than that from shale, it might be possible to obtain something in the nature of a lubricating oil from that. Perhaps Dr. King will tell us something more on that point.

In this co-operation between the Edinburgh Gas Department and the Fuel Research Board we have a most happy combination brought to bear on a problem which has interested the carbonization industries for many years. In

olden days, cannel was widely used for the Gas Industry, and it would now appear from these experiments that cannel can again be used profitably by the Industry, certainly in certain districts. I feel I should like to congratulate the Edinburgh Gas Department, and particularly Mr. Jamieson, upon the important results which have been obtained. It is clear that this investigation will benefit the consumers in Edinburgh very materially—and it has already done so in the fact that cannel has been used in the way it has. I should also like to thank those concerned for their public spirit in allowing the results to be made available so that others may reap benefits from their investigations.

Testing on Sound Lines.

Mr. T. F. E. Rhead (Birmingham): Previous speakers have not left very much to be said, but I should like to pay tribute on two grounds to this very valuable Paper, the first being the re-examination of the cannel question in the light of modern practice, and the second, the very valuable collaboration of the Institution with the Fuel Research Station which gives the advantage of the latest equipment for testing such products as tars from hydrogenation processes, &c., and also bringing with it the advantage of the assistance of a personnel second to none. Personally, I should like to pay tribute to the Fuel Research Station, from inside knowledge, for the extremely helpful way in which they are coming to our aid in the Gas Industry.

The Paper shows that the testing has been carried out on thoroughly sound lines, such as we have come to expect from the Fuel Research personnel. The results, of course, are extremely striking to our modern conceptions of gas manufacture. Anyone obtaining 1,000 therms from a retort per day is about 10 per cent. above the nominal, and one is naturally very surprised. In comparing the effect of steam, I agree it is rather a pity the Authors were not able to carry out a non-steaming test. Perhaps they will be able to do that in their further programme. The calculations from the hydrocarbon enriching value certainly show an increase with increasing steaming, but the variations in the cannel itself are even more tantalizing than those found with some of our gas coals. The production of breeze is remarkable in that it is not much more than the original size of the coal—viz., ¾ in. I should like to ask the Authors how much cannel was rejected in crushing—the quantity below ¾ in. size. With regard to the gas analyses, I agree with Dr. King that the question of methane was the first consideration by the Gas Industry, because it is very frequently confused with a proportion of ethane. A minor point is that the trommel test described in the Paper is really a combined shatter and abrasion test, and I should like to have Dr. King's views on the question of standardizing that test.

Previous Experiments.

Dr. H. G. Colman: I have studied this Paper with the very greatest interest for several reasons. Eighteen years ago during the last years of the War I was concerned with similar cannel tests carried out on behalf of the Ministry of Munitions Oil Production Department, and that alone increases my interest. But I was also exceedingly glad that the Fuel Research Board has again taken up the study of this question. The Ministry of Munitions Oil Department tests to which I have referred were made in 1918—at the same time as their investigations into supplies of cannel, of which you have heard, were undertaken—to see how far it was possible from existing cannel supplies that were obtainable at that time, and from existing carbonizing plants, to obtain additional supplies of oil capable of being used as oil fuel, for reasons, of course, which are manifest to everybody.

These tests were carried out on the Woodall-Duckham continuous vertical retort installation at Birmingham and on the Glover-West installation at St. Helens, during the earlier part of 1918, with the co-operation of the Woodall-Duckham Company, of West's Gas Improvements Company, and the Birmingham and St. Helens Gas Departments. Mr. T. F. Winmill and myself were there on behalf of the Ministry. There were also many other people present including Mr. J. West, who was at St. Helens at the time, and Mr. Erminger, who was in charge of the plant. It is not necessary for me to enlarge in any great detail on the results then obtained for, in general, these are in very close agreement with the figures which the Authors have given to-day. Differences exist, of course, but these differences are only such as can be accounted for by the different nature of the cannel used and by the fact that the steaming conditions were not the same as those in a modern continuous vertical retort.

The cannel available for our main series of tests was a low quality Yorkshire cannel which though fairly low in ash—something like 10 per cent.—only contained about an average of 32 per cent. volatile matter as compared with an average of about 45 per cent. in the cannel used by the Authors, and, of course, one would expect the yields of oil and gas to be considerably less. At the same time, as in the tests which the Authors give, it was found possible in the continuous vertical retorts to carbonize rather more cannel per day in each installation than was their normal throughput with bituminous coal. Also, it was found—again in agreement with the Authors—that increased external retort temperatures caused no material increase in cracking. Such higher temperatures, however, had the advantage of markedly increasing the rate of throughput and of the gas made per ton. This lack of cracking at high retort temperatures we, in agreement with the Authors, attributed to the non-caking properties of the cannel. As the material does not coalesce on heating to form a plastic mass, the core of the material remains full of channels throughout the carbonization, and the oil vapours, as formed, pass off mainly through this relatively cool core and come only to a very slight extent in contact with the highly heated retort walls.

Different Crude Spirits Obtained.

The crude oil condensed from the gas, and the crude spirit scrubbed from the latter, were very different in character from the similar materials obtained from bituminous coal, but in both cases their composition was very close to the description given by the Authors of their products. Owing to the lower quality of the cannel used in our tests the yield of oil was much lower—viz., about 18 to 19 gal. of crude oil per ton and 2 or 3 gal. of crude spirit.

At the same time we carried out short tests with Scottish cannels, such as Wemyss and Lochgelly cannels, and although the quantities did not enable us to get very accurate figures, the indications were that cannels such as these would give a yield of the order which has been obtained from Newbattle cannel. We also carried out other experiments at the same time, on a small scale, on English cannels, and it may be of interest to say that, for instance, one of the most celebrated cannels used for gas enrichment—New Abram cannel from Wigan—gave a yield of over 70 gal. of crude oil and 8 gal. of crude motor spirit per ton. The North Wales cannel from the Mold district gave results only slightly lower, and I believe that some of the old carbonizing plants used in the 'sixties still exist there; they did not so very many years ago. I have been told that there is now little or no Abram cannel remaining unworked, but that there are very large supplies of the North Wales cannel still available. No doubt Dr. King has the geological information, but I have been told there still remain immense deposits of the North Wales cannel in the Flintshire district which would pay if they could be got out—and that is the crux of the whole matter.

A further point of interest in respect of the oil yield from the different kinds of cannel which we observed at the time—and have done so since—is that the higher the volatile matter in the cannel not only is the yield of crude oil per ton higher, but, what one would not necessarily expect to follow, the quality of the oil improves. By quality I mean the proportion of the different hydrocarbons of the paraffin, naphthene, and olefine series contained in it, and at the same time there is a smaller quantity of those substances classed together generally as asphaltic bodies which separate on dilution of the crude oil with light petroleum spirit. The whole of the evidence which we have—which I do not mean to say has been carried any farther—is that certainly it would indicate the richer cannels will give a far better raw material from the hydrogenation point of view and will also be much more likely than the lower quality cannels to yield lubricating oil. In the case of the crude oil obtained in our tests with the Yorkshire cannel, the amount of asphaltic bodies was 25-30 per cent. whereas in the case of the oils from the rich cannels it was usually not much more than 5 per cent.

Gas Yield from Cannel.

With regard to the yield of gas obtainable from cannel, the figures in the Paper are much higher than those we obtained. We only obtained figures of something like 12,000 cu.ft. of 525 B.Th.U. gas per ton, and this is accounted for in part to the lower quality of cannel used; but it is also due for the most part to the different steaming conditions in the retorts. At that time steaming in the continuous vertical retort was in its infancy, and both the installations at Birmingham and St. Helens on which the tests were made had not been built with the idea of using any more than a small percentage of steam. Although in our tests we used about the same quantity of steam as the Authors have done—viz., about 30 per cent.—only a com-

paratively small proportion of that could be converted into water gas in the retorts, and I have no doubt that in a modern continuous vertical retort setting with the same quantity that we used, the yield of gas would be vastly increased because of the increased production of water gas. The increased production of water gas in the Authors' tests is shown by the fact that whereas in these experiments at Edinburgh the yield of CO amounted to an average of more than 6,000 cu.ft. per ton, in our tests it only amounted to between 1,800 and 1,900 cu.ft. per ton.

There is one other point of rather a different nature to which I should like to refer, and that is the use of the cannel coke in carburetted water gas plants. The Authors have tried the coke from Newbattle cannel and have found that this can be used very satisfactorily in a carburetted water gas plant, but I do not think it is safe to draw the conclusion that this will be the case with all cannel cokes even if they are low in ash. I base that statement on some ancient theories of my own in Birmingham, I do not know quite how long ago. We did not try the actual coke from this Yorkshire cannel but sometime about the end of last century we were carbonizing cannel in Birmingham for the purpose of the enrichment of gas which was necessary in those days, although we had just started carburetted water gas and were hoping not to do it any more. We happen to have had a cannel rather low in ash, and it was decided, as the carburetted water gas plant was going in, to try this cannel coke in that plant. We did so and so far as the generating plant was concerned the result was very satisfactory. No trouble was experienced. The fuel and oil figures were good, but when the doors were opened for clinkering there was a surprise. Not only was there no clinker, but there was hardly any ash. That might be regarded as favourable in one respect, but it had very serious disadvantages.

The fact is that with this cannel, as with many other cannels, the ash is so extremely finely divided and is so infusible that as the ash forms on the outside of the coke, the ascending current of the blow gases carried it forward right through the carburettor and the superheater and out at the stack pipe. That was in the days before there were any fly-catchers and so on! The ash was therefore distributed on the ground and on the roofs of the surrounding district, and you will not be surprised to learn that it gave rise to very serious complaints.

A much more serious result from the technical point of view was that the fine ash had also been carried forward with the water gas during the run right through the carburettor and superheater into the condensers and had separated with the tar. The result was that the tar produced contained about 5 per cent. of ash and the effect of the presence of so much finely divided solid matter was that the whole of the tar came down in the form of a viscous, almost non-separable, emulsion which filled up the separators and the tanks, and it was more than three months before these were got straight again. I think therefore the use of cannel coke in carburetted water gas plants is a matter which must be dealt with cautiously to see if the particular cannel gives a coke that is suitable for the purpose.

Success Dependent on the Coke Obtained.

Mr. JOHN WILSON: It is of particular interest to observe where the beds of cannel lie. It appears to me that the ultimate success of the carbonization of cannel depends very largely on the coke made from it. If this coke is suitable and if there is a market for it, then work can go ahead and we shall get the benefits of the tar and oil yields. I notice that in Edinburgh the percentage of cannel used at the moment is only 2·1 per cent., and I should like to ask Mr. Jamieson if he really thinks that he could successfully market a very much larger quantity of cannel coke either locally or for export and so enable him to use a higher percentage of cannel in his coal.

I notice that the hydrogen sulphide content is given as more than double, using cannel, than when using ordinary Scotch coal. While the figures might not materially influence production costs, they might otherwise add to the problem of purification. I notice also that in several parts of the Paper mention is made of the Gray-King assay plant a very valuable piece of plant to have in any gas-works laboratory; but it would be interesting to know if the Authors have tried adapting this plant for vertical retort application instead of horizontal retort application. Some few years ago at Motherwell, Mr. McDonald, the present Gas Engineer (but my assistant at that time), and I tried out this experiment more or less satisfactorily, but the resultant gas and by-products obtained from the same coal showed different characteristics when fitted vertically as against horizontally; and the results were sufficiently indicative to be a guide to the difference to be expected between vertical and horizontal practice. With the retort tube in the vertical position one can obtain a measure of the swelling and coking propensities of the coal treated. We also experimented with a silica tube retort of special design to permit of steaming the charge; but the effects on the resultant products due to such steaming were quite different and again gave an indication of the results under practical working conditions. Perhaps the Authors have considered some such experiment on the foregoing lines in the next stage of their investigations—unless, perchance, the full realization of Programme No. 1 rendered unnecessary the carrying out of Programmes 2 and 3.

Calorific Value and Appliances.

Mr. GEORGE HELPS (Nuneaton): Reference is made in the Paper to the calorific value of the gas in Edinburgh. In 1900 it was 790 B.Th.U., then it went from 790 to 500 B.Th.U., and to-day we have 600 to 200 B.Th.U., a difference which is far too great. In connection with this question of calorific value, I would like to tell you that it is bound up with the question of simplification of appliances. I do not know whether you have thought of it yourselves—probably you have—but it seems to me that I can now definitely see that the days of the bunsen burner are numbered, and I would ask you to appreciate that if that be so, or anything like it, what an immense difference it will make to all the appliances that are used.

At the opening of the Paper reference is made to research work. Of course, there is nothing more important than research, but I have my own views about what research should be. I saw depicted in Edinburgh the other day a man holding a wash bottle, and that was entitled "Research"; I do not think much of that. I think the time has come when the question of the quality and the preparation of gas before it reaches the appliance should be dealt with, and although I have been nearly ruined once or twice during my career in the Gas Industry, I am prepared to provide anything from £100 to £500 towards research in connection with the quality of gas which should to-day be distributed.

The CHAIRMAN: The Institution is very much indebted to Messrs. Jamieson and King for this Paper, which, together with the most interesting discussion upon it, will form a valuable addition to the Proceedings of the Institution. I am very sorry I am compelled to close the discussion, and I will ask anyone who desires to contribute to it to send their remarks in writing. For the same reason I am sorry I cannot ask the Authors to reply at this moment.

Mr. E. B. TOMLINSON then briefly introduced Mr. Baker's Paper.

There was no time for discussion upon it, and a cordial vote of thanks was passed to the Author.

The President's Luncheon

The President's Luncheon at the Savoy Hotel, London, on Tuesday, May 26, was presided over by Mr. STEPHEN LACEY, and there was the usual representative attendance not only of members of all sections of the Gas Industry, but of other industries and the various scientific societies.

The Toast of " The King " having been honoured,

The CHAIRMAN proposed " The Guests," at once expressing the general regret at the enforced absence through illness of the President, Colonel Carr. The Institution, he said, had been very fortunate in having Colonel Carr as its President during the past twelve months, for he was one of the outstanding figures in the Gas Industry by reason of his vigorous and original mind, his rare combination of technical and commercial ability, and his unshakable confidence in the future of the Industry. In the course of his year of office, continued the Chairman, Colonel Carr had spent his energy without stint in the service of the Institution, at the same time carrying on his unremitting work as Engineer and Manager of the Stretford and District Gas Board, as well as undertaking additional responsibility as Managing Director of the United Kingdom Gas Corporation. The Chairman said he was glad that among the guests were Mr. Alderman Wardle, Chairman of the Stretford and District Gas Board, and the majority of his colleagues on that Board. He extended to them all a hearty welcome and thanked them for the support they had given to the President and for the service they had thereby rendered to the Industry as a whole.

Continuing, the Chairman said that the list of those who had accepted the President's invitation indicated the scope and variety of the work of the Institution, and there were so many distinguished guests present, all of whom were counted as friends of the Institution, that he could only name a few in the short time available. He would first mention the group of principal guests engaged in the national work of the Industry, representing the National Gas Council, the British Commercial Gas Association, the Society of British Gas Industries, and the Gas Companies' Protection Association, and the Institution itself on the Council of the British Gas Federation, which spoke for the Industry as a whole. He was glad that nearly all the members of the Council of the Federation were present, and he specially welcomed the Chairman of the Council and leader of the Gas Industry, Sir David Milne-Watson.

Next, the Chairman said he would like to mention two old friends in Mr. J. R. Clynes and Mr. Will Thorne, whom they were always delighted to welcome because of their profound interest in the human relationships within the Gas Industry, which had for so long been a source of pride to the Industry and an example, if he might say so, to others.

Then they had as guests many of those who, whether members of the Institution or not, made special contribution to its work, or who were playing a special part in making this Annual Meeting a success. Among others he had in mind the members of the Technical and Educational Committees of the Institution, the representatives of Leeds University and of the Fuel Research Board, and Medallists and Authors of Papers. In this connection there was one guest missing whom he would like to mention. He was thinking of Dr. E. W. Smith who, after a long and serious illness, was, he was pleased to say, now through the wood and well on the road to complete recovery. Mr. Lacey said he was also particularly glad to welcome visitors from overseas; from Australia, Belgium, Japan, and Norway. They were also honoured by the presence of distinguished representatives of kindred technical and scientific associations with the activities of which they were brought into closer and closer touch the more thoroughly they did the essential work of the Institution, which was to promote by all means in its power the application of science to the carbonization of coal and to the manufacture, distribution, and utilization of gas and coke. They were proud to belong to the large family of technical and scientific bodies which, collectively, did so much to advance the material prosperity of the community as a whole.

Again, they were very glad to see Mr. J. M. Kennedy, the President of the Institution of Electrical Engineers, Sir Richard Redmayne, Past-President of the Institution of Civil Engineers, and Dr. Levinstein, President of the Institution of Chemical Engineers, who would recognize, he felt sure, the exceptionally close connection between the activities of their respective Institutions.

Representatives of Government Departments.

Finally, the Chairman said he came to the group of representatives of Government Departments, mentioning by name first their friend Mr. Ronca, Director of Gas Administration at the Board of Trade, through which Department of State the Government looked at the Gas Industry when it could take its eyes off the electrical industry. Then there was Dr. Fox, the Government chemist, who had recently succeeded Sir Robert Robertson in that important office, and also occupied the position of Vice-President of the Institute of Chemistry. He believed this was the first time Dr. Fox had been the guest of the Institution, and he had the greatest pleasure in offering him a hearty welcome and coupling his name with this toast. Dr. Fox would be specially interested in the research work to which the autumn meetings of the Institution were devoted, and to the regulations, either statutory or self-imposed, in regard to the quality of gas supplied and in the way it was used. It was hoped that Dr. Fox's interest would be maintained and increased in the future, and he could certainly assure him that the Industry welcomed, and indeed generally initiated, any investigations having a bearing on its internal efficiency and service to the public. The Gas Industry did honestly strive to give the public good value, and evidence that their combined efforts were appreciated was rapidly increasing at the present moment. For example, in the area of supply of the Company he served, modern gas appliances to the value of £3,000,000 would be installed in the course of the present year. That represented quite a startling increase as compared with preceding years, and, as it was typical of the country as a whole, it well justified their confidence in the future.

Value of a Benevolent Fund.

Dr. J. J. Fox, O.B.E., responding, said that although it was his first visit to these luncheons, he saw so many familiar faces that he really did not feel particularly strange. He did not propose to speak of the necessity for research and information, neither would it be appropriate for him to deal with the much discussed subject of whether a technician ought to be a manager or not. That was a matter he would leave to them to discuss in their quiet moments. Looking at the reports which had been issued by the Institution, however, he was very glad to see there was a Benevolent Association, for he felt there should be one attached to every scientific Institution in the country. Looking at The Institution of Gas Engineers generally, he took it that their members were required to have that experience which was perhaps best called post-graduate. Everybody knew that the young men of to-day had to undergo a heavy course of training for graduation. That was the beginning, but it was after that they required specialist knowledge which could only be acquired by being attached to such an Institution as this. What pleased him most was the fact that the Institution was engaged either in fostering, or actually carrying out, research. The necessity for research was now penetrating even the mind of the average member of the public, and there was that excellent organization, the Department of Scientific and Industrial Research, for the express purpose of furthering research in this country. Of all the researches which the Institution had undertaken there was one in particular which had appealed to him for the many years he had had to handle such problems, and that was the corrosion of appliances by the products of combustion. There were also other problems such as the production of motor spirit by the hydrogenation of coal and creosote, and one very important one which they might well have to face, even if they were not already facing it, was the production of lubricating oils from coal. While something could be done with regard to motor spirit from coal, the question of lubricating oil must be an ever-pressing problem to this country which had to depend for the moment upon overseas supplies. He was pleased to see that the Institution did not indulge in the favourite practice in hard times of cutting down expenditure on research.

Continuing, Dr. Fox said he had been much interested in the Gas Industry's interest in the matter of road tar and creosote oils, and he felt that intensive research in the matter of road tar might help to obtain something which would replace natural asphalt and bitumen. He believed there must be rapid improvement in that direction in the future resulting from the investigations which the Industry

now had in hand. There was one thing he wished specially to mention, and that was that the Gas Industry was too modest. The public did not know of the existence of the Institution; it did not know that it had existed for three-quarters of a century, and it did not know what the Institution did. He would also like to see the Institution a little more closely in touch with other research institutions where work was being done in which collaboration with the Gas Industry would be of value. Finally, Dr. Fox said he would like to introduce a domestic matter and tell the Gas Industry that his wife would not use gas coke because she said there was too much ash in it. It was no use his explaining that the ash in the coal must get into the coke; his wife simply would not use it. She preferred anthracite and therefore he suggested that possibly that was one of the reasons why coke was not more widely used.

Chemical Engineering and the Industry.

Dr. H. LEVINSTEIN proposed "The Institution of Gas Engineers" and coupled with the toast the name of Mr. Harold C. Smith, Vice-President of the Institution. He was very grateful for the opportunity of being present as the President of a kindred and sister, although rather junior, Institution, the Institution of Chemical Engineers, which was playing an important part in what he believed would be a very successful Chemical Engineering Conference in June. The close association of his own Institution with The Institution of Gas Engineers afforded him great satisfaction and the connection between the two was really very marked. The first President of the Institution of Chemical Engineers was their old friend the late Sir Arthur Duckham, whose name in the Gas Inudstry was as famous as it was in the chemical industry and in the wider field to which he afterwards devoted his talents. The leader of the Gas Industry, as Sir David Milne-Watson had been described, was Chairman, and Dr. Smith was Vice-Chairman, of the Organizing Committee, while they also had Dr. Carpenter and Mr. Alexander closely associated with the Institution of Chemical Engineers in the work of the Conference.

The Institution of Gas Engineers actually represented a very important branch of chemical engineering, and therefore the connection between the two Institutions must of necessity be very close, for the Gas Industry represented, in its own way, one of the greatest triumphs of the technologist over Nature. After all, what had Nature done for us? She had allowed to die off and rot the most magnificent forests such as were now only to be seen in the tropical parts of the world, and there remained only a dirty fossil which was contaminated with every kind of débris and dirt. It was out of that unprepossessing fossil that we had succeeded in building up modern chemical industry. Ignorant as we were in our knowledge of the constitution of coal, it was an outstanding achievement to extract from it, as the Gas Industry had done, those constituents which, by a curious inconsistency, enabled us to cool ourselves when we were warm, warm ourselves when we were cool, and light our darkness if we chose, although he had better be a little careful in this respect having regard to the presence of other interests! Not only had all this been done with coal, but there were also extracted from it the materials which made it possible to provide the colours required for so many purposes and enabled us in one direction, perhaps, to rectify the errors and omissions of Nature herself. All this was derived merely from a process of distillation and a few simple rather brutal chemical operations such as nitration, reduction, and crystallization, and in that way a great industry had been built up which had changed the face of the world during the last 60 years, for, although he might go back 120 years, the real triumphs of the technologist had been probably during the past 60 years. He was thinking, for example, of the chemical definition and constitution of the benzene ring. All that had been done by taking that fossil which had been carelessly left as the degradation product of those glorious forests.

In proposing the toast of "The Institution of Gas Engineers" and wishing it continued prosperity, Dr. Levinstein said he was impressed with the solvency of the Institution's Benevolent Fund and also by the financial strength of the Institution itself. At the same time he wished to stress the great importance of the suitable education of the young men entering the Gas Industry.

The Coal Industry.

Mr. H. C. SMITH, responding, referred to the remark of Dr. Fox as to the undue modesty of the Institution and, of course, publicity was not one of the jobs of the Institution. At the same time the Gas Industry had a body which carried out publicity and propaganda, the President of which was actually sitting next to him. As to the mention by Dr. Fox of his wife's refusal to burn gas coke because there was too much ash in it, he did not know where Dr. Fox lived, but if it would help him at all he suggested that Dr. Fox should either persuade his wife to use a gas fire, or he himself would furnish Dr. Fox with one or two addresses where he believed coke could be bought without too much ash. [Laughter.]

Speaking of ash in coke, Mr. Smith said, reminded him of another matter which he was certain the President would have alluded to had he been present. It would be remembered that at the November meeting the President spoke of the proposed voluntary increase in the wages of the miners, and it was decided at that time that the Gas Industry had no objection whatever to that proposal. In fact, the Industry welcomed the miners being paid a fair living wage. At the same time, it had every objection to the Coal Mines Bill. The Industry agreed to the increase on existing contracts on condition that it went to the miners. Indeed, they were pressed to agree by the Government. Since that time the Government had introduced a Bill, about which they were having rather a rough time, in which the Government was almost compelling the coal owners to get together and charge the Gas Industry and other public utilities any price they liked for their coal and, at the same time, to sell any quality the owners liked irrespective of what the Gas Industry and others might want. The Gas Industry, however, for some years had been specially preparing coke for domestic consumption, and in doing so had had to choose coals very carefully. Therefore, the Industry was not going to sit down without protest, and without making a fight, and be told they were not to be allowed to buy the coals they required in order to supply consumers with the coke they wanted.

Entitled to a Fair Tribunal.

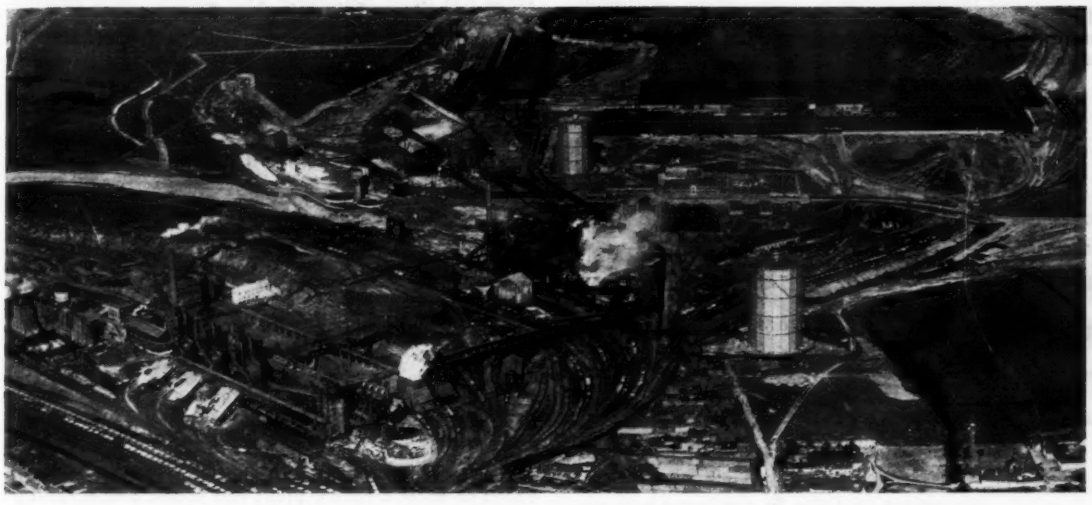
The coal industry need not think that the coke consumers were going back to burn raw coal, because they were not. A generation was growing up now which had never had its meals cooked by raw coal. All their meals were cooked by gas cookers—perhaps in the presence of the President of the Institution of Electrical Engineers he might say that *temporarily* a few meals were being cooked by other means. [Loud laughter.] However, the majority of meals were cooked by gas cookers, and the Gas Industry in addition was turning out every week thousands of raw coal grates and putting in gas fires. This process was not going to stop. If they were unsuccessful in convincing the Government that they were entitled to have a fair tribunal to whom an appeal could be made if coal prices were unfair or qualities unsuitable, then the Institution would immediately have to undertake research which would enable it to make more gas from less coal. Such work, as a matter of fact, had already been put in hand—for example, with the idea of getting all information possible on the complete gasification of coal under pressure by the use of oxygen and steam. This work would be pressed on with. He did not think that any industry ever yet found that it sold more of its products by putting up its prices to a higher level than was economic, and he was perfectly certain the coal industry would find that to be the case also.

Finally, Mr. Smith said he would like to refer to the retirement from the Honorary Secretaryship of Mr. W. E. Price after 23 years in that office. Mr. Price was more affectionately known to most of the members as "Uncle," and it was going to seem rather strange at the Council meetings not to have this wise Councillor present to keep them right whenever they seemed to be getting into any difficulty. Personally, said Mr. Smith, he had the pleasure of serving on the Council for nine or ten years, and it was going to be a great personal loss to those who had worked with Mr. Price for so long that they would not see his genial face at the Council meetings. [Hear, hear.]

Sir ERNEST BENN, proposing "The Chairman," said there was some significance to him in the fact that Mr. Lacey, in the unfortunate absence of the President, was presiding at the 73rd Annual Meeting of The Institution of Gas Engineers. This was not a post-war mushroom growth Institution. It had been in existence for 73 solid years, and it had been able to produce men to lead the Institution to the great heights it had reached to-day. He had also been interested when Dr. Levinstein referred to the importance of looking after the younger members of the Industry, and he had been led to wonder whether there was any other Institution in the land which could produce two Presidents-elect who possessed between them not one single grey hair. [Loud laughter.] It seemed to him that this was a case of youth at the helm and what they did with the old men he was still in doubt! Perhaps the profession of gas engineers carried with it the secret of perennial youth.

The CHAIRMAN briefly acknowledged the toast.

Institution Visit



An Aerial View of the Works.

Stewarts & Lloyds' Corby Works

On Thursday, May 28, members of the Institution visited the Corby Works of Stewarts & Lloyds, Ltd., where they inspected the coke ovens, blast furnaces, bessemer plant, rolling mills, and tube works.

Although the new Corby Works have sprung into being with their accompanying new town in the short space of three years, their inception was not due to a sudden isolated decision, but was the logical outcome of a carefully considered policy which has been consistently adhered to by the Company for many years.

Since 1910 there had been a small iron works at Corby, but the developments resulting in the Corby Iron and Steel Works as they are to-day were planned as recently as 1930, when the world depression had set in, and a period of increasingly difficult circumstances faced the country. It was therefore not until the end of 1932 that a modified scheme received the necessary financial support, and the £3,000,000 or so required was made available.

The transformation has been effected within the brief space of three years. Corby, a typical old English village, with its church dating back about three centuries, its thatched roofs, and its narrow winding streets, has now side by side with it a new attractively designed town, possessing every modern amenity.

It has been no small task to accomplish satisfactorily the transplanting from their native heath to Corby of over 800 families, in addition to a large number of single men. But in offering acceptable homes, and in helping in every way they can to create a good social environment, Stewarts & Lloyds have simply acted up to their belief that their duty does not by any means end with the turning out of a good article.

The operations of these works are based on the ironstone deposits of Northamptonshire, one of the largest in the world, of which Stewarts & Lloyds own and control some 500 million tons. The Company have mined this ore and operated blast furnaces in the district for the production of pig iron for many years, so that they have available a wealth of practical experience with all these ore bodies and of local conditions pertaining to their mining. This has enabled them to acquire the best contiguous areas in the Northamptonshire ore field where the ore can be won at the lowest cost and from which several million tons annually can be supplied for many years to come without materially increasing the assembly cost.

The iron and steel works comprises in the main an ore-treating plant specially designed to cope with the peculiar physical and chemical qualities of the ores as well as the irregularities typical of these deposits; a modern blast furnace installation of three units, including the largest in Britain and embodying many new features to enable the operation to be conducted along the most efficient lines and under an entirely new method of smelting not heretofore used; a modern coke and by-product plant, designed to produce a quality of coke most suitable for the production of low silicon pig iron from the Corby ores; a basic bessemer plant of new design, including a large hot metal mixer, a phosphate slag plant, and a lime-burning plant—the first to use blast furnace gas—and three converters; an installation of blast furnace gas fired soaking pits with metal recuperators; a heavy blooming mill; blast furnace gas fired reheating furnaces with double metal recuperators; a strip mill of the continuous type for rolling strip for the tube works, and a continuous narrow strip mill, now under construction.

Of special interest is the cleaning, distribution, and use of the surplus blast furnace and coke oven gases. The entire Corby operation is carried on without the use of coal or other extraneous fuel, excepting the coking coals charged into the coke ovens. In the raising of steam, heating of ingots, and re-heating of billets and slabs, as well as in the steel works and rolling mill operations, the fuel used is either blast furnace gas or coke oven gas, or a mixture of both. The coke ovens are fired with blast furnace gas, making available the whole of the coke oven gas for other uses within the plant and for supplying the town of Kettering with domestic fuel, through the Kettering Gas Company.

The problem of cleaning the blast furnace gas at Corby was a difficult one since the Northants ores, being carbonates, produce an unusually large amount of very fine dust upon becoming calcined in the upper part of the furnace. The apparatus used to carry out these cleaning processes are, for the dry stages, large individual dust catchers, one at each furnace, followed by a joint installation of smaller diameter whirlers; for the wet stages, a group of multiple-stage tower washers and disintegrators, followed by an electrostatic precipitation plant.

By-Product Plant.

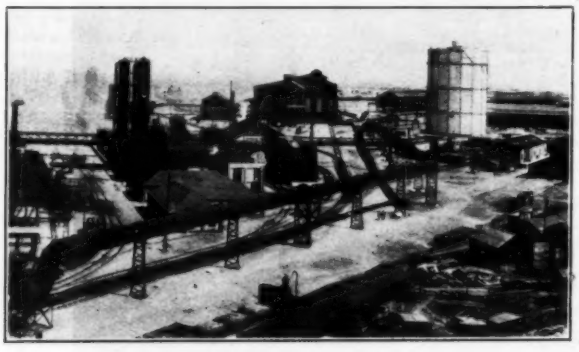
The by-product plant consists of 35 Becker type coke ovens, of the cross-over flue regenerative combination type, arranged in a single battery. The capacity of each oven is approximately 14½ tons of coal, and the plant was designed for an output of 3,500 tons of coke per week. Either blast furnace gas or coke oven gas can be used for firing, and the gas mains are arranged so that any selected number of ovens can be heated by blast furnace gas, while the remaining ones are heated by coke oven gas.

After passing through the screening plant, the furnace coke is conducted to the blast furnaces by means of belt conveyors, and is there distributed by a shuttle conveyor operating above the coke bins.

The gases are flushed with liquor and the condensed tar collected. Final tar extraction is by electrical precipitation units in parallel. From a holder of 1 million cu.ft. capacity the gas is distributed to the various plant units. Surplus gas is released through a bleeder automatically controlled.

The by-products plant comprises an ammonia plant and a benzole plant. The first-named is of the indirect re-

covery type and no liming of the liquor is employed, as the effluent evaporation plant is designed to recover ammonium chloride for use within the works. The benzole plant is designed for recovering a crude spirit, equivalent in quality to a once-run product; a secondary fraction being simultaneously obtained which contains the wash oil and the naphthalene.



By-Product Plant and Gasholder.

Both the coke oven plant and the by-product plant are being extended to deal with largely increased outputs.

There are also four horizontal floor Knowles ovens, designed to produce blast furnace coke, pitch coke, and domestic coke from a liquid charge of non-coking coals and tar. The cycle of operation is to produce first pitch or electrode coke from tar alone and then mix the resultant distillates with non-coking coals to produce coke suitable for blast furnace or domestic use.

The Basic Bessemer Plant.

Being the only basic bessemer plant in this country, a short description may be of interest. It was designed by H. A. Brassert & Co., Ltd. Each of the three converters has a capacity of 25 tons, with a maximum of 28 tons, and they are supplied with molten pig iron from a 1,000-ton mixer of special design to conserve heat properly and equalize the variations in the hot metal. This mixer is fired by automatically controlled coke oven gas burners, one at each end, with an auxiliary burner at the spout. The metal is brought to the mixer directly from the blast furnaces in 60-ton ladles.

The basic bessemer vessels are blown by two turbo-blowers, so designed that the air pressure is maintained at any required figure. Blast furnace gas fired kilns provide the requisite lime.

The soaking pits operate with straight blast furnace gas or with mixed gases; the proportion of blast furnace and coke oven gas in the mixture is automatically controlled and is variable between wide limits. From the soaking pits the ingots are transferred to a 40-in. reversing blooming mill, and after being rolled to specified dimensions the blooms, slabs, and billets pass to up-cutting hot shears, for cutting into slabs. Eventually, the billets pass into re-heating furnaces or into stock. These re-heating furnaces can be fired on a mixture of blast furnace and coke oven gas having a calorific value up to 180 B.Th.U. per cu.ft., and they are the first to be built in this country with all-metal recuperators.

Finally, there is the strip mill from which the finished coils of steel emerge ready, after cooling and inspection, for transfer to the tube works by means of a special electric locomotive.

The Tube Works.

The tube works buildings have a covered area of 14 acres. A broad central roadway divides them into north and south sections. In the former are the tube mills, galvanizing shop, and services. The various finishing shops, tube and fittings warehouses, and packing departments are grouped in the south section. These discharge the finished and packed products into a transverse loading shed.

Two processes of tube manufacture have been installed:

(*a*) *Fretz-Moon*—a continuous welding process for tubes from ⅛ to 2 in. nominal bore. There are three mills of this type, with an annual output capacity of 140,000 tube tons.

(*b*) *Wellman Push Bench*—for seamless tubes, with a range of 2½ to 4 in. nominal bore, working in conjunction with a reducing mill of a special type for reducing down to ¾ in. nominal bore. The capacity of this plant is 50,000 tube tons per year.

The "hot-dip" process is employed, and two large galvanizing baths are in operation. The "black" tubes are first pickled thoroughly to remove scale and clean the surfaces; for this purpose a special type of pickling equipment has been installed. This ensures that the tubes are constantly moved while in the acid tanks, and that the acid circulates freely over both external and internal surfaces.

After pickling, the tubes are washed, drained, and fluxed all over in a special liquid flux bath maintained at a temperature of 160° F. (70° C.). The tubes are then allowed to drain; when dry, the surfaces will be found to be covered with a thin and even coating of flux.

They are then fed into the molten zinc baths in which they remain until the zinc has thoroughly coated the surfaces. On withdrawal from the bath by means of a magnetic roller train, the excess of zinc from the outside surface is removed by passing the tube through a circular jet of air, which has also the effect of "sealing" the hot zinc surface.

The inside of the tube is cleaned from stray flux or beads of zinc by means of a jet of superheated steam, after which the tube is quenched in water and passes on roller conveyors to collectors under an overhead crane.

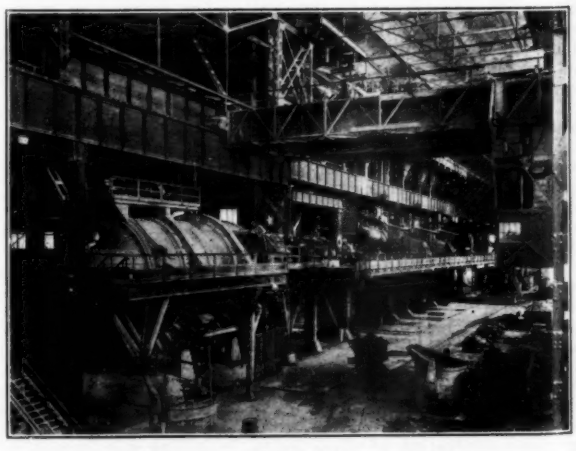
From the four finishing shops, the tubes pass to the warehouse sections. The total warehouse capacity is about 10,000 tons. The main stocks are in the range 2-in. and under, arranged by qualities (*e.g.*, gas, water, and steam; galvanized and ungalvanized); separate sections are allocated to short lengths, plain end tubes, and special gauges.

At the south end of the warehouse run bogie tracks which are used for bringing tubes as required from the various bays to the packing trestles, on which the tubes are bundled, wired, labelled, and marked. From these trestles, the tubes are carried by gravity on small bogies in to the loading shed, where the two lines of sidings are served by three overhead gantry 5-ton cranes and a 3-ton petrol-electric mobile crane.

Just south of the Tube Works Office is a small building allocated to the Inspection Staff. Here are kept the various sets of "reference" gauges against which the "working" gauges, used at the tube mills and in the finishing shops, are checked at frequent intervals. The reference gauges are themselves checked periodically by exceedingly accurate measurements taken in specially designed machines in a Central Gauge Room which provides this service for all the Tube Works of the Company, thus ensuring a uniform standard throughout.

Routine examination is also made of all screwing tools before these are issued to the shops, and for this purpose an optical projection machine of the latest pattern is employed.

The Tube Works buildings represent the most modern practice in industrial shop design. Over the furnaces and tube mills, whole panels of the glass roof are hinged longitudinally and can be raised or lowered by the operation of push buttons on the roof columns in the shops. In all other sections, patent ejector type ventilators are fitted in the ridges. Even in hot and windless weather, these ventilators are capable of exhausting the air in the shops two and a half times per hour. They can be closed when desired by means of shutters.



Basic Bessemer Plant with Hot Metal Mixer.

During winter, heated air is circulated throughout the finishing shops and warehouses by means of fans which blow air through gilled tube radiator units.

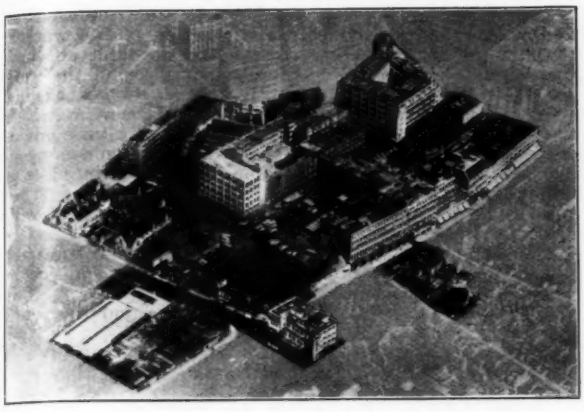
Piling commenced at Corby on the bare ground in January, 1934; the first tube was rolled in November, 1934.

"Where's George?"

Institution Seeks Answer to the Well-Known Question

Visit to J. Lyons & Co., Ltd.

On Wednesday, May 27, members of The Institution of Gas Engineers visited the Cadby Hall Factory and the Greenford Works of J. Lyons & Co., Ltd.



An Aerial View of Cadby Hall.

CADBY HALL.

To give an adequate impression of the wealth of interesting things which members of the Institution and their ladies saw during the course of their inspection of the Cadby Hall Factory in Kensington of J. Lyons & Co., Ltd., would be impossible within the confines of this brief reference. But some idea of the interesting processes which were witnessed may be gleaned from the following extract from an article by Arthur Machen which we reproduce from the firm's souvenir brochure.

A while ago, I was standing in a vast room, on one of the many floors of Cadby Hall. At one end of it a great metal chute came down from the floor above; and down the chute flowed a mighty river of dough, never ceasing. At the bottom of the chute dwelt a mechanical goblin, which fell upon the dough, and so worked with it that two plump rolls, shaped like the roly-poly pudding of our fathers, issued forth and appeared on an inclined plane.

I looked along the great room, and perceived that the moving incline became a moving platform. And on it, as far as the eye could see, the rolls of dough went two by two in procession, going on and on till they passed into a huge house of iron; and this was the moving oven, oil-heated. Through this cunning apparatus the rolls of dough slide slowly on inevitably, going at such a pace that when they at last issue forth they appear as loaves with just those golden heads of appetizing crust that I remember long ago.

But their trials do not end here. They pass on into a kind of rack full of shelves which all move, and go to and fro, and from side to side, and up and down, in a kind of solemn and antique dance. Here the loaves are being cooled and aired; and again they start on their journeys, and pass on, and fall into the hands of yet more goblins of mechanism, which wrap paper about them, and so send the loaves on their journeys into the outer world; over 5,000 of them every hour of the day.

And from the moment of the mixing to the moment of delivery at your door, no hand of mortal man or woman has touched those loaves, no hand at all, save the hands of the mechanical goblins, who do greater marvels than those performed by the goblins under the rule of Suleiman-ben-Daoud, on whom be peace!

But the goblins are busy in every quarter of this vast Cadby Hall; rampant on every floor of it; never ceasing their work of taking hold of every kind of raw material that goes to the making of bread, rolls, Dundee Cakes, Scotch Madeira Cakes, Cherry Cakes—cakes of every kind; all the family of tarts and cheese cakes as Sancho Panza called them, Swiss Rolls in their varieties, and Meringues and Macaroons and Petit Fours. Cadby Hall is also the home of Ice Cream, of which more than three million portions in a day are sometimes served; of lemonade and orangeade, made daily from fresh fruit; of pies, puddings, dumplings, and many cooked foods.

And now to follow the migrations of the Swiss Roll.

You see the mixture travelling on two endless steel bands towards the oven. After five minutes in this giant furnace it emerges cooked and golden, in flat layers; this at the rate of 3,000 large Swiss Rolls or 5,000 small Swiss Rolls every hour.

Then the mixture, having been cooled to the requisite temperature by purified air, rolls on again; and, as it journeys, a machine of the goblin family coats it smoothly with cream, or with jam, or with chocolate, according to the order.

And there are various delicacies which are to be put into boxes. Squares of cardboard lie before you; they go on their way and fall into the mechanical hands which pat and persuade, and turn here and twist there, and in a moment the flat cardboard has become a neat and accomplished box.

Such is the last stage in the romantic journey of the Swiss Rolls; the goblins clap them up securely in the boxes they have fashioned, and they label the boxes, and number and date the boxes, and send the boxes rolling on their way to the floor below, and Addison Road Station, and the myriad shops.

But let it be acknowledged; in this great factory of cakes and buns, rolls and loaves and dainties, there are certain operations which are beyond the most ingenious of the goblins, which no machine can perform.

But there is no danger in this. All the girls or men who have to touch what is to be eaten are obliged not merely to have perfectly clean hands, but to have manicured hands; and I saw the special manicure room and the operators at work.

Cadby Hall covers over 14 acres of land, and extensions and new buildings are being erected continually. Besides the Head Offices, Cadby Hall is occupied by the Bakeries, the Kitchens, and the Ice Cream department.

THE GREENFORD WORKS.

Alternative to the visit to Cadby Hall, members of the Institution and their ladies had the opportunity on the Wednesday afternoon of inspecting the Greenford Works of J. Lyons & Co., Ltd.

It covers an area of 70 acres and deals with tea, coffee, cocoa, custard powder, toffee, chocolates, and confectionery.

The following impressions of the Greenford Works are taken from H. V. Morton's "A Box of Chocolates," also extracted from the firm's attractive souvenir brochure.

When you have accepted the freedom of the Greenford Factory for an afternoon, as I did, you are unable to look a Lyons' chocolate in the face again without seeing in a dream, as it were, the bustling drama of diverse activity that lies behind each one of them; a drama of scientific manufacture.

The home of Lyons' chocolates lies in open country some three miles from Ealing. The factory looks like a rich man's hobby. If Henry Ford or John D. Rockefeller or any other wealthy man became suddenly obsessed with the desire to make chocolates for the sheer love of the thing, he would build a factory exactly like the Greenford factory.

It is designed so that raw materials go in at one end and begin a steady march through the factory till they emerge at the other end as chocolates.

Everything dovetails. There is no hitch anywhere. At one end cocoa beans, syrup essences, flour, honey, butter, cream, milk, and eggs are unloaded; at the other end trains are receiving these same products in boxes, transformed

into chocolates during their direct, unhesitating procession through the factory, and ready to be carried to the thousand channels of commerce that await them. Similarly, packets of tea, tins of cocoa and coffee, custard powder, toffee, and sweetmeats emerge in their hundreds of thousands.

Before you or I could produce a chocolate as well dipped as a Lyons' chocolate, we should have to spend a few hundred thousand pounds in erecting a special room for the purpose. Chocolates must be dipped in an atmosphere of 65° F. The air in this room must be absolutely clean. Lyons' chocolates are dipped in a room permeated by air that has been scientifically cleansed and temperatured.

In a small laboratory a number of solemn men were eating chocolates. I have never seen anyone eating chocolates with the same queer expression.

"What are they doing?"

"They are testing for variation in flavour. A subtle difference in taste, not noticeable by the general public, is nevertheless corrected. These men have wonderful palates and can track down the very faintest variation."

We continued the progress to the logical conclusion; vast packing and distributing rooms. In one, girls sat placing a uniform assortment into boxes; in others, men moved about among pyramids of crates; while at a dock-head waited a train and an army of motor vans.

Until one has seen Lyons' Tea Factory at Greenford, it is impossible to realize the wealth of detail and organization necessary to produce a perfect cup of tea.

Every one of the thousands of chests of tea opened each day is brought by train, van, or barge direct to Greenford, where wonderful overhead conveyors take it to automatic elevators. After the chests have been grouped according to the plantation from which they come, the tea passes through sifting, cleansing, and cutting machines. It enters the blending drums, from which it is withdrawn over powerful electric magnets which extract any stray metallic particles. It is then thoroughly tested before being released for packing.

Research.

In the Research Department opposite Cadby Hall, where some 150 experts are at work, samples of all raw materials brought in are analyzed. Batches of every product are examined during preparation, and again before the commodities are distributed to the public.

Experts in industrial psychology are employed at Cadby Hall and Greenford. The position of the worker, the adaptability of the chair or seat to the table at which the work is being carried on, the disposition of the work and the elimination of laborious methods are their constant study. They go from department to department, watching the work in progress, correcting faults, and giving advice with a view to making the tasks as little irksome as possible, so that fatigue and boredom shall be reduced to a minimum.

There is also a first-aid department at Greenford, with dental and other clinics.

The Company maintains an extensive road transport fleet of about 1,750 motors and horse vans, in addition to using contractors' vehicles.

Lyons' vans travel a mileage of twice round the world every day.

Figures about Lyons.

Number of employees of J. Lyons & Co., Ltd , over	30,000
Number of meals served in Lyons' restaurants, corner houses, and teashops in one year	150,000,000
Number of cups of coffee sold daily, over	400,000
Number of menus used per week	55,000
Number of packets of tea sold daily, over	1 250,000
Portions of ice cream sold daily have reached over	3,000,000

It is of interest to note that the annual consumption of gas in all Lyons' establishments, associated hotels, and factories is nearly five million therms—approximately 1,000 million cu.ft.

A Visit to the Portsmouth Gas-Works

On the morning of Friday, May 29, members of the Institution visited Portsmouth, where they had the opportunity, at the kind invitation of the Directors of the Portsmouth and Gosport Gas Company, of inspecting the Hilsea Gas-Works.

History and Development.

The Company was incorporated 115 years ago under the name of the "Portsea Island Gas Light Company." Although introduced into the streets of London some years earlier, it was in June, 1821, that gas lighting was first installed in the streets of Portsmouth, the majority of which were, in those days, within a radius of a mile of H.M. Dockyard, the town itself being surrounded by moats and other fortifications which have long since disappeared.

During the past few decades the efficiency of gas has led to its use in many directions other than those originally foreseen, as the following figures show:

Year.	Cu.Ft. of Gas Made.	Number of Consumers.
1895	700 millions	10,600
1915	1,578 ,,	50,500
1935	2 846 ,,	76 318

The acquisition of the Gosport District Gas Company on Jan. 1, 1936, has added considerably to the Company's area of supply, and it is now approximately 200 square miles, with a population of 350,000. The combined Undertaking—which takes fifteenth place in the United Kingdom in point of size—serves over 90,000 consumers, and during the present year it is estimated that the gas made will be in the region of 3,400 million cu.ft.

There are three gas manufacturing stations—namely, at Hilsea, Flathouse, and Gosport.

The Hilsea Works, which is the largest of these, has a maximum daily output of 10¾ million cu.ft. of gas (48,000 therms) and has storage accommodation of 5 million cu.ft. Of the two retort houses, one is a steel frame brick building containing two benches of continuous vertical retorts, while the other is a panelled brick structure which formerly housed two benches of horizontal retorts. Only one of these latter benches remains, however, the other having been replaced in 1933 by an installation of intermittent vertical chamber ovens. There are also three sets of carburetted water gas plant.

Offices and Showrooms.

The Chief Offices and Showrooms occupy a prominent position in The Square, Portsmouth, opposite the Guildhall, and were built in 1914 to replace a building erected on the same site in 1877.

In addition, there are Branch Offices and Showrooms at High Street, Gosport (the Head Office of the former Gosport Company), at North End, Havant, Waterlooville, Fareham, Lee-on-the-Solent, Bishop's Waltham, and Emsworth. The Showrooms at Havant were enlarged and modernized last year and are now among the most up-to-date and best equipped District Showrooms. Sites have been acquired for the erection of larger Showrooms at Emsworth, and for new ones at Cosham, so that all the outlying districts of the Company's area are, or shortly will be, well served in this respect.

It is the policy of the Company to sell gas at a low price and the scale of charges ranges from 7d. down to 4½d. per therm. Compared with the basic charge of 7d., the prepayment consumers pay 8d. per therm where a meter only is supplied, and 8·3d. per therm where a meter and fittings are supplied.

The great importance of giving efficient service to all classes of consumers is receiving increasing attention by the Management. To ensure that every appliance installed in consumers' houses is giving the best possible results, and to afford an opportunity of suggesting to the consumer ways and means of labour-saving by the use of gas in its various domestic forms, a system of house-to-

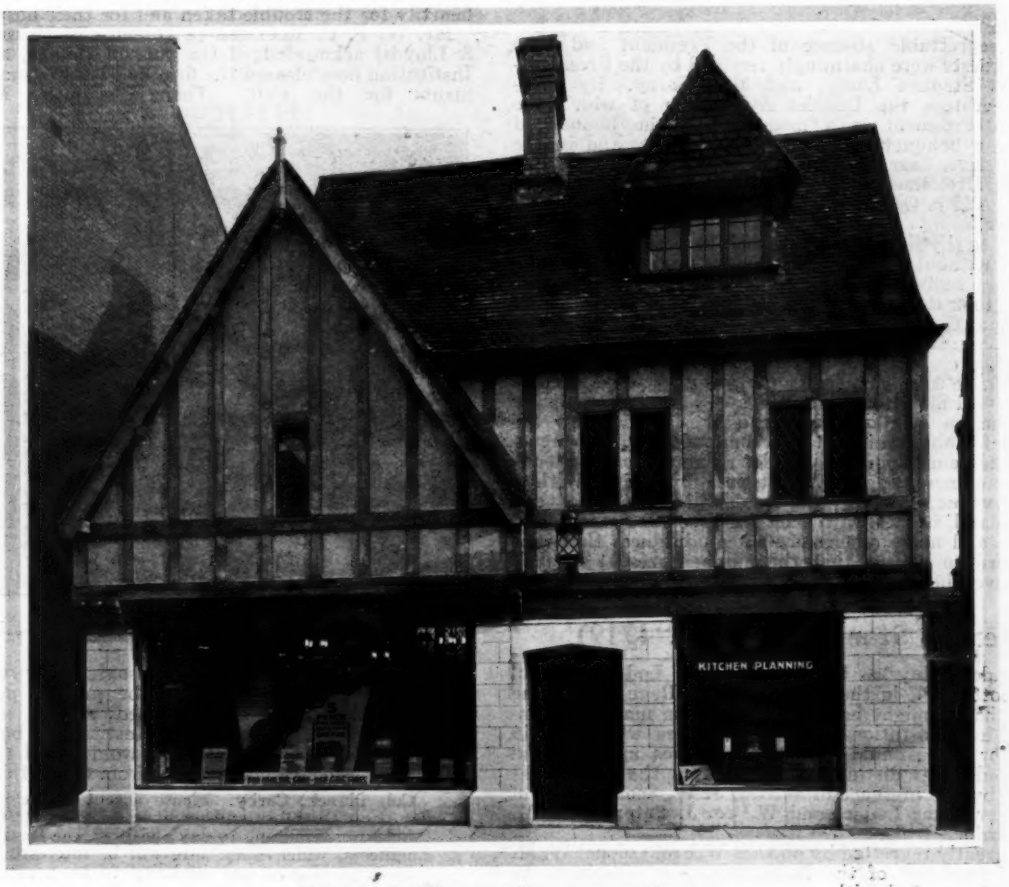
Chief Offices and Showrooms, the Square, Portsmouth.

house inspection of apparatus and appliances was instituted some years ago.

Another phase of this work is the Home Service Section. This is becoming more and more important, especially in view of the prevailing preference on the part of consumers to purchase their own cooking stoves rather than hire them from the Company. The four lady demonstrators who have been specially trained for this work, were able to make over 11,000 calls during 1935, their custom being to follow up the purchase of appliances by a visit to the home of the purchaser where instruction in the use and care of the new appliances is much appreciated.

In conjunction with the Company's sales policy there is a staff of district canvassers, all of whom have been selected from the ranks of the fitters, and have proved their ability as salesmen. During the year 1935 nearly 65,000 houses were visited by these men, who were thereby responsible for the disposal of various types of appliances exceeding a total value of £25,000.

Since 1926, the Stove, Meter, and Repair Workshops and Stores have been accommodated at the Rudmore Works. Hired cookers are here subjected to a complete renovation, the number dealt with during 1935 reaching the record of 13,656. Cookers now let out on simple hire are being sprayed with an oxi-di-silver finish, which by reason of its brighter appearance is exceedingly popular among consumers. The Meter Repair Shop deals with about 100 meters per week. Plans are in course of preparation for necessary extension to the buildings and plant at these works, including the storage and office accommodation.



New Branch Offices and Showrooms at Havant.

Social Events and Visits

THE RECEPTION AND DANCE.

A change was made this year, for the reception and dance were held in the Great Room of Grosvenor House, Park Lane, W. 1, on the Wednesday evening, attended by a record number of guests.

Mrs. W. M. CARR.

In the regrettable absence of the President and Mrs. Carr, the guests were charmingly received by the President-Elect, Mr. Stephen Lacey, and Mrs. Lacey. By time-honoured custom the District Association of which the Institution President is a member has the honour of presenting a bouquet to the President's wife; and in the absence of Mrs. Carr on this occasion the pleasant duty of presenting Mrs. Lacey with a bouquet of cream and tea roses fell to Miss Osborne, a niece of Mr. A. L. Holton, of Manchester.

Dancing to rhythmic strains of Jack Palmer and his Band continued without intermission from 9 p.m. until 2 a.m., except for half-an-hour when "The Gas Engineers' Cabaret" took the floor. During the evening, too, the golf prizes won at the Spring Meeting of the S.B.G.I. Golf Circle on May 25 were presented by Mrs. Lacey. Further details will be found elsewhere in this issue.

Referring to this popular annual event in our columns last year we drew attention to the fact that the popularity of the function had long since caused it to outgrow the really comfortable limit of the accommodation, and movement on the dance floor and circulation among one's friends had become increasingly difficult year by year. With a change of venue, however, this trouble has been more than overcome, and, in fact, with such a degree of comfort could one dance and move among one's acquaintances that it is indeed hard to believe that the number present totalled almost eleven hundred.

Evening Star Lodge (No. 1719)

On Monday, May 25, the Evening Star Lodge (W.Bro. W. A. Scott, J.P., in the Chair) held its Regular Meeting in order that it might be able to entertain masonic members of The Institution of Gas Engineers who were in London for the Annual Meeting. Besides many Grand Officers and other distinguished brethren, the Lodge was honoured by the presence of W.Bro. J. W. Scott, W.M. of the Northern Star Lodge, and W.Bro. J. Paterson, W.M. of the Murdoch Lodge.

It was greatly regretted by all that W.Bro. Colonel W. M. Carr, the President of the Institution, was unable to be present owing to ill-health.

THE VISIT TO CORBY.

That it was possible, within the limits of a half-day trip, to travel in comfort, lunch and dine well, and gain a very fair knowledge of all that goes on in the huge "four-in-one" works at Corby, signified a triumph of organization and co-operation by Messrs. Stewarts & Lloyds and No. 28, Grosvenor Gardens. The "S. & L. Special" on Thursday arrived at Weldon and Corby Station at 2.10 p.m., and left again at 6.25; and the 4¼ hours which intervened were divided as to the minute. The 220 visitors were made up into 16 parties, and the parties into 8 coach-loads; and at zero hour the assault troops deployed simultaneously at numerous points in the vast expanse of Corby. The subsequent timetable was observed meticulously, which meant that every visitor saw the maximum possible with the minimum difficulty or fatigue.

Some columns elsewhere in this issue are devoted to a description of the works; here it must suffice to record that the pyrotechnics of the Bessemer plant and the incredibly efficient production of butt-welded tube—miles of it a day—were probably the features of an engrossing tour that left the deepest impressions. Certainly it was at those locations that lagging feet caused the greatest anxiety to the most painstaking guides.

Each party's programme allowed an interval during which tea was served in a marquee; and this provided the opportunity for Mr. Harold C. Smith, Institution Vice-President, to express to the Chairman and Directors of Stewarts & Lloyds the thanks of the Institution for the privilege of visiting their wonderful works, where every process was carried out from the getting of the ore to the mass production of steel tube by the most modern methods. The programme of the Institution's Annual Meeting invariably comprised a series of interesting visits, but he thought that in Corby they were seeing something conceived on a grander scale than they had visited before. The magnitude of the undertaking was impressive, and it testified to the foresight and courage of the Directors that they had projected and laid down such a works during the depth of the depression. He thought the organization of the visit had been extraordinarily good, and thanked them heartily for the trouble taken and for their hospitality.

Mr. W. F. C. McCLURE (a Director of Messrs. Stewarts & Lloyds) acknowledged the vote of thanks, assuring the Institution how pleased the firm had been to make arrangements for the visit. Their Chairman, Mr. A. C. Macdiarmid, had sent a message saying how sorry he was, owing to indisposition, not to be present personally to greet them. They all regretted deeply the enforced absence of the President of the Institution, but were glad to have good news of him. He would read the following telegram received that morning from Colonel Carr:

The Institution Arrives at Corby

> Col. Planck, Corby. Please accept and convey to your Company Directors and members of your staff my grateful thanks for arranging to-day's visit of The Institution of Gas Engineers, which I am sure will be interesting to all participating. Regret my inability to be present in person. Carr.

The following reply was sent to Colonel Carr :

How nice of you to telegraph us. We are all so sorry you are unable to be with us. The Institution of Gas Engineers are at present in these works, and we hope are finding their visit interesting. All best wishes for speedy and complete recovery. Planck.

After tea each party had a remaining section of the works to inspect; and finally the majority of the visitors

Of Messrs. Stewarts & Lloyds.

From L. to R.: W. R. Long, Col. O. B. F. Planck, D.S.O. (Local Director), D. M. Cann, H. J. Rhodes (Director), S. C. E. Lloyd, E. C. Carbutt, G Le Mare.

re-entered the marquee, while the "JOURNAL" took a photograph. Returning to the station, the coaches took the route through the model township that has grown up alongside a magnificent new enterprise.

PORTSMOUTH.

Traditional weather once again smiled upon the Friday excursion, for which over 200 members and guests of the Institution left Waterloo by special train at 9.19 a.m. At Portsmouth they were met by Mr. Thomas Carmichael (Deputy-Chairman and General Manager), Mr. W. H. Bennett (Director), and Officials of the Portsmouth and Gosport Gas Company; and the day's entertainment began. Alternative visits before luncheon had been arranged, and the fine works at Hilsea were open for inspection by those who could resist the call of H.M. Dockyard and H.M.S. "Victory." For those who did not resist, we print elsewhere an illustrated description of the Hilsea Works and other stations of the Company.

At Shanklin.

Parties 11 and 12, Corby.

Guests of the Portsmouth and Gosport Gas Company.

Luncheon, by invitation of the Chairman and Directors of the Portsmouth and Gosport Gas Company, was served in the Guildhall. The Chairman, Alderman F. E. Beddow, D.Sc., Ph.D., J.P., presided over a very large gathering which included the Lord Mayor and Lady Mayoress of Portsmouth, the Mayor and Mayoress of Gosport, and Sir Russell Bencraft, Chairman of the Southampton Gaslight Company.

Alderman F. E. BEDDOW, proposing the health of the guests, took the opportunity to thank a large number of the members of the Institution for the contributions which they made to common knowledge and which were printed in the Technical Press. And that was not the end of the Papers, for many of them retained their "JOURNALS," indexed them, and constantly consulted them, so that the Papers contributed continued to produce effects months after publication. He thanked the members of the Institution. The Portsmouth and Gosport Company were very proud that their General Manager, Mr. Thomas Carmichael, was able to contribute his share to the common knowledge. [Applause.]

Continuing, the Chairman wished all the visitors a happy afternoon, though he regretted that the occasion was not fixed for two days earlier, when they could have seen the "Queen Mary." However, there were other attractions, and no doubt some would take a busman's holiday and visit Hilsea and Rudmore, where they would be welcomed by his Company. In conclusion he wished to say how sorry they were that Colonel Carr was absent, but all were delighted to know that he was progressing favourably.

A Presentation.

At this juncture the Institution presented to the Lady Mayoress a beautiful bouquet of red carnations and gladioli, to Mrs. Lacey one of carnations, and to Mrs. Carmichael stocks and larkspur. The presentations were made, amid applause, by the Lady Members of the Institution Staff.

On Behalf of the Guests—

The Rt. Worshipful the Lord Mayor of Portsmouth, Alderman W. J. Avens, J.P., expressed thanks for the welcome extended to them. The Gas Company, though a great competitor, had always worked very harmoniously with departments of the Corporation, and none could deny that the commodity they supplied was extremely useful from the public utility viewpoint. He wished to pay a tribute to the way in which the Company looked after their employees; only recently he had watched them winning the Senior League Cup and had had the pleasure of presenting the cup to them. He congratulated the Company upon the amalgamation with Gosport, feeling sure that it would be of mutual benefit to both places. He was glad to see so many visitors, and trusted they would enjoy seeing part at any rate of their beautiful city.

Mr. STEPHEN LACEY, Senior Vice-President of the Institution, also replied, and thanked the Chairman most sincerely for his kind and sympathetic reference to the President, Colonel Carr, the influence of whose personality and the value of whose work could not be better shown

PORTSMOUTH

Friday,

ISLE OF WIGHT

May 29.

than by the fact that in spite of his absence they had had a most successful meeting. He, Mr. Lacey, was grateful to hear that the Portsmouth Gas Company attached so much importance to the proceedings of the Institution. During their three days' meeting in London, they had done serious work; and the Lord Mayor had remarked that sometimes gas disturbed the nerves of individuals. It was also true to say that gas at times disturbed the nerves of electricity suppliers. The Institution had done honest work in the last few days, and they were now delighted to visit the historic City of Portsmouth at the invitation of the Gas Company and enjoy their hospitality. The Institution were exceptionally proud that the Deputy-Chairman and General Manager of the Company was a highly valued member and a member of the Council. Mr. Carmichael was evidently at home in seaports. He started his career in the Gas Industry in Glasgow, and then, following the natural instinct of Scotsmen, he travelled south and stayed a few years at Nottingham on the way, eventually landing at Portsmouth where he had made a great name for himself. After a reference to the Company's apparently remarkable influence upon that irresponsible person, the Clerk of the Weather, Mr. Lacey concluded by thanking the Company for a day of great hospitality—one that would be unforgetable to all.

Mr. HAROLD C. SMITH, Junior Vice-President, said that one more toast was called for. With Mr. Carmichael's usual modesty it had been omitted from the list, but Mr. Alexander's characteristic energy had discovered the omission. It was the toast of the Portsmouth and Gosport Gas Company. Most of the guests had taken the opportunity that morning of visiting H.M.S. "Victory," and Mr. Carmichael would not take that amiss, for many had visited the fine works at Hilsea before, and they knew that Mr. Carmichael would be pleased at any time to show them again. On behalf of the Institution he expressed hearty thanks to the Chairman and Directors and to the Staff of the Company for the hard work that had to be done on such an occasion.

Mr. THOMAS CARMICHAEL, who was received with acclamation, thanked Mr. Smith sincerely. He assured the visitors that they of the Company were all very pleased to have them there, though they deeply regretted the absence of Colonel Carr. They would be glad to hear read the following telegram:

> Please accept and convey to your Company Directors my grateful thanks for arrangements made and generous hospitality on the Institution's visit to Portsmouth and Isle of Wight to-day. It will be greatly enjoyed and appreciated by all. Regret my inability to express thanks in person. Am making good progress towards recovery. Carr.

[Applause.]

Continuing, Mr. Carmichael said how much they all appreciated what their Senior Vice-President, Mr. Lacey, had done for them in presiding over their deliberations at the 73rd Annual Meeting. It had meant a great deal of hard work at very short notice, and merited their heartiest thanks and congratulations. Mr. Carmichael concluded with an acknowledgment of what his staff had done in connection with the visit. They had worked hard; indeed, as far as he personally was concerned, he had received his instructions that morning—all he had to do was to meet the special train at 11.5 a.m.

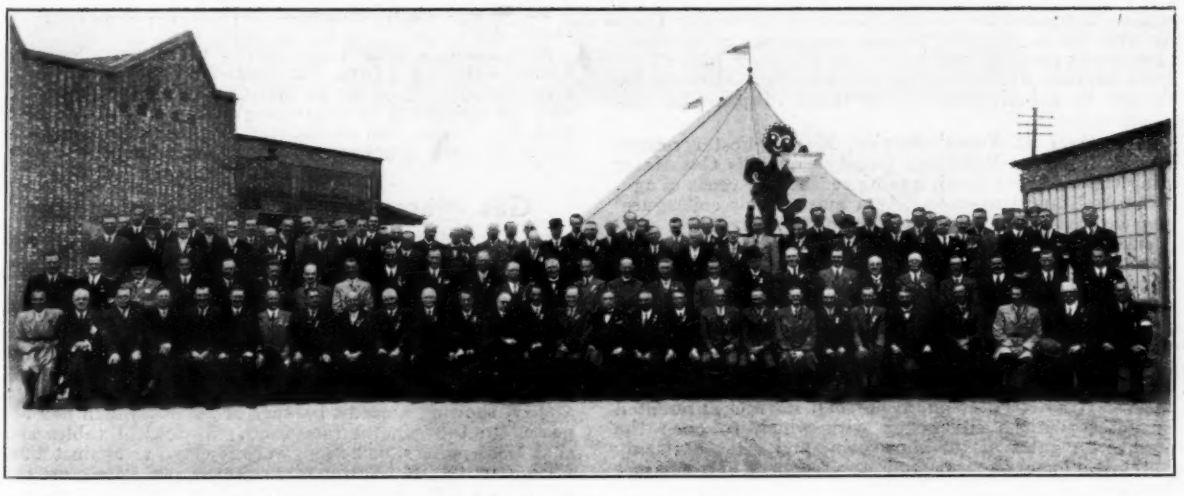
THE ISLE OF WIGHT.

By coach to the Clarence Pier, special steamer to Ryde Pierhead, and a train, the visitors speedily found themselves sitting at tea in the Eastern Pavilion as guests of the Ryde Gaslight Company. Here the Mayor and Mayoress of Ryde and the Chairman and the Engineer (Mr. F. W. Taylor) of the Company appeared on the platform accompanied by Mr. Lacey and Mr. Alexander. The Mayoress accepted a bouquet from the Institution, and then the Chairman, supported by the Mayor, offered the visitors a hearty welcome. In response, Mr. Lacey assured them that he could imagine no better finish to a delightful day than a visit to the Isle of Wight—England in miniature—and to an undertaking connected with such a famous name in the Gas Industry as Taylor.

And then into coaches again for a most enjoyable tour which included Sandown, Shanklin, Godshill, and the beautiful north-east corner of the Island. Many of the party took the walk through Shanklin Chine, and in the gardens above the Chine had the pleasure of a warm greeting from Mr. W. T. Deeks, Chairman of the Shanklin and Ventnor Gas Company.

Back to Ryde—special boat—special train waiting—supper—Waterloo 8.15 p.m.—an excellent excursion—wonderfully organized. Well done again, Mr. Secretary!

The Ascot Works at Neasden



Group taken at the Ascot Works.

On Thursday afternoon, May 28, a party of some 175 members, including the Acting President, visited the Works of Ascot Water Heaters, Ltd., at Neasden, special coaches being provided for the journey.

The Works have been recently described in some detail in both the "JOURNAL" and the "SALESMAN," but their wonderful organization and obvious efficiency were a revelation to those who had not previously had the opportunity of inspecting them. The liveliest interest was displayed in all the many operations which go to make one appliance, in the precision with which the operations are carried out, and the care with which every stage of production is tested to ensure that there is no possibility of default from the standard which Ascot has set itself.

The conditions under which the employees work are, of course, ideal. But even ideal works conditions would not have ensured such comfortable and thorough inspection as was possible to the visitors had it not been for the organization which Dr. Friedman and his staff had worked out, and which was carried through without a hitch—so exactly, in fact, that the last party, without the least hustle or bustle on the way, emerged from the last doorway precisely according to time schedule.

While the party was subsequently enjoying the hospi-

tality of Ascot in the spacious canteen room, Mr. STEPHEN LACEY took the opportunity of proposing a vote of thanks to Dr. Friedman and the firm for what, by general consent, was a quite exceptionally interesting works visit. Mr. Lacey referred to what he described as a somewhat hackneyed phrase—romance in industry—but in the case of the works they had just inspected there really was more than a touch of romance. It would be remembered, he said, that when the first attempt was made to introduce into this country the appliances now known as "Ascot," the Gas Industry had more or less told Dr. Friedman that they would take interest in them only if they could be entirely British made. To-day, only a few years later, they had seen the result of what had amounted almost to a challenge, and Ascot water heaters, known throughout the British Gas Industry, were being made from beginning to end in a model factory in the North of London. From the processes of manufacture it was quite clear, if they had not known already, that the appliances produced were precision instruments, and the whole of the afternoon's proceedings had a distinct bearing on the very important subject with which Mr. Masterman had dealt in his Institution Paper. If every appliance which the Gas Industry had produced had been subjected to the same detailed testing at every stage as were the Ascot water heaters, there need not have been much worry on the part of gas undertakings in respect of "gas safety precautions."

The vote of thanks was seconded by Mr. R. ROBERTSON (Bristol) and carried with a degree of acclamation which left no doubt that the party really had enjoyed the visit.

Dr. B. FRIEDMAN then very charmingly returned thanks, reading first of all a telegram which he had received from the President, Colonel W. M. Carr, expressing his regrets for absence. Referring to Mr. Lacey's reminiscences of the introduction into this country of the Ascot heaters, Dr. Friedman recalled that his firm were under a debt of gratitude to Mr. Lacey himself for help and encouragement in the early days. He had given Mr. Lacey, among others, a definite pledge to play his part to the utmost towards establishing a good hot water service; he left it to their judgment to what extent he had been successful. Of his staff—his colleagues he preferred to call them—he could not speak too highly. He had heard praise that afternoon for the way in which they had conducted the parties round the works, and for the knowledge they displayed in the many processes of manufacture. But their collaboration with him went a very great deal deeper than that, and without their marvellous loyalty and skilled assistance from the very beginning, the firm could not possibly have attained the position it holds to-day.

News in Brief

There Will Be No Meeting of the Central Executive Board of the National Gas Council during the month of June, we are informed by Mr. W. J. Smith, the Secretary of the Council.

The British Chemical Plant Manufacturers' Association have sent us a copy of their Official Directory—"British Chemical Plant, 1936." This useful compilation contains well-classified particulars of the member firms, many of whom are actively engaged in the work of the Gas Industry.

An Exhibition of cooking, heating, and other gas appliances is being held by the Ardrossan Gas Department from June 2 to 5. There are cooking demonstrations twice daily in the afternoon and evening. The exhibition was opened by Baillie Thomas Ferguson, Convener of the Gas Committee.

Application for a Special Order under the Gas Undertakings Acts, 1920 and 1934, is intended to be made to the Board of Trade by the Bognor Gas and Electricity Company with the objects *inter alia* of acquiring certain lands for gas-works purposes and modifying the provisions affecting the charges which may be made by the Company for their gas by substituting a new standard price for the existing one.

After Over 32 Years' Service, Mr. T. Foster retired this week from the Middlesex County Council's Gas Meter Testing Office, Angel Road, having reached 65 years of age. He was Assistant Inspector. As a mark of his colleagues' esteem he was presented with a crocodile skin wallet, suitably inscribed, by Mr. G. E. Seppings, Inspector of Meters, in the absence of the Chief Officer of the Public Control Department.

The New Showrooms of the Berwick and Tweedmouth Gas Light Company, Ltd., in Bridge Street, Berwick, were formally opened last week by Mrs. H. R. Peters, wife of the Chairman of the Directors, in presence of a number of Directors and friends. Mr. James Paterson, of the firm of Messrs. Gray & Paterson, architects, Berwick, presented Mrs. Peters with a silver key with which to open the wrought-iron gates of the showroom, and after declaring the premises open, she was made the recipient of a bouquet of roses.

Chemical Engineering Congress

Intending Members Should Register at Once

We are asked by the General Secretary to state that a large number of applications for membership of the Chemical Engineering Congress of the World Power Conference, which meets at the Central Hall, Westminster, on June 22-27, has already been received. In order, however, to avoid a last minute rush, with possible delay, intending members who have not yet registered should apply as soon as possible to the General Secretary at 56, Victoria Street, S.W. 1.

Cookery Demonstrations at Guernsey

Excellent Sales as a Result

At the last afternoon session of the recent cookery demonstrations which were conducted for ten days at the showrooms, Mr. R. G. Luxon, Manager of the Guernsey Gas Light Company, Ltd., expressed his appreciation on behalf of the Board of Directors to the hundreds of ladies who had come along to these demonstrations. He said that at every session they had looked as if they had thoroughly enjoyed themselves, and he assured them that the Company had enjoyed having them.

Continuing, Mr. Luxon said: "Miss Sanderson, I know, is an old friend of many of you, and I want to pay a tribute to her exceptional skill as a practical cookery demonstrator." On behalf of the Directors he then presented Miss Sanderson and Miss Bradshaw with suitable mementoes.

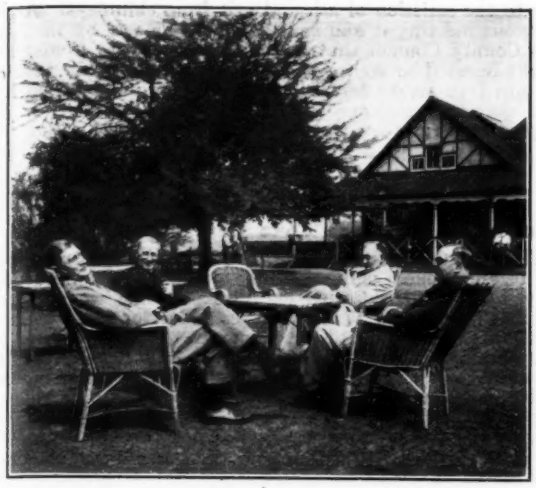
The ladies present showed their appreciation by sustained applause.

Miss Sanderson, in reply, spoke of the excellent sales results obtained during the demonstrations, the cookers alone having passed the 60 mark at which she had aimed, and she concluded by expressing her thanks to the Directors, Mr. Luxon, and all the staff for their help, and to the ladies for their generous reception of her efforts.

Gas Meter Testing at Birmingham

Annual Report

The Annual Report of the Official Inspector of Gas Meters to the Birmingham City Justices' Gas Meter Testing Committee for the year ended March 31, 1936, states that the number of meters tested totalled 86,482 as against 89,112 last year, a decrease of 2,630, and the fees charged amounted to £6,097, a decrease of £100 as compared with last year. The expenditure for the year amounted to £3,912, showing a credit balance of £2,185, which has been passed to the general rate fund. Statistical tables show that 1,961 meters, or 2·26%, were rejected as against 2·04% last year. Of the 1,961 meters rejected, 509 were more than 2% fast, 559 were more than 3% slow, while 443 were rejected for unsoundness—*i.e.*, 116 external and 327 internal. The rejections for excessive absorption of pressure numbered 147, or 1·7 per 1,000 of the total meters tested. Disputed meters submitted for re-verification and certification numbered 161, of which 117, or 72·67% were incorrect. Of the 86,482 meters tested, the standard and high-capacity type numbered 62,866, repaired meters numbered 32,484, and prepayment meters numbered 59,308. The highest monthly percentage of rejections was 2·9, and the lowest 1·82. During the year a 1-10 cu.ft. standard test holder has been re-conditioned and submitted to the Board of Trade for re-verification, and the remaining standards and auxiliary instruments have been maintained in good working order.



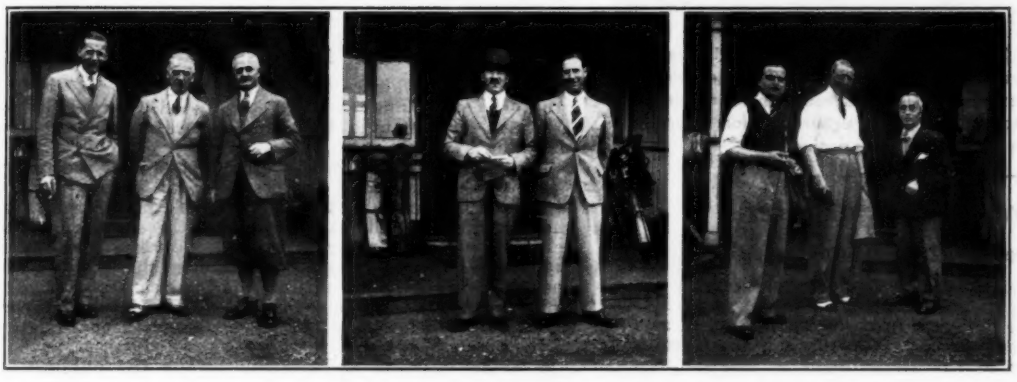
"S.B.G.I." Golfing Circle

Royal Mid-Surrey

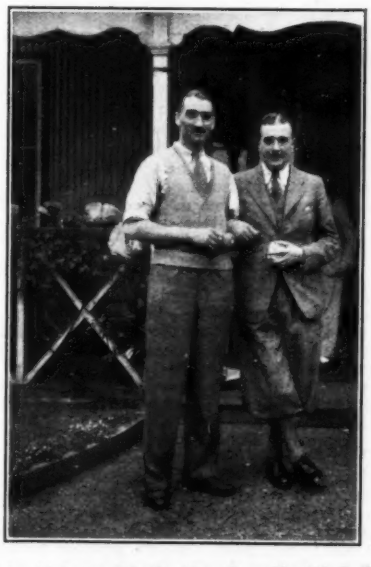
May 25, 1936

Mr. Cyril G. Davis, with the Donor of the Cup. Right: Mr. C. H. Kempton, Winner of the Thornton Victory Cup.

On Monday, May 25, the S.B.G.I. Golfing Circle held their Spring Meeting at the Royal Mid-Surrey Golf Club, Old Deer Park, Richmond, to which they invited members of the Institution. In addition to the members' competition for the Thornton Victory Cup, prizes were offered for the visitors. The weather was fine, the course in excellent order, and a delightful day was spent thanks to the admirable arrangements made by the Hon. Secretary of the Circle, Mr. W. R. Edgar, and the charming hospitality of the members.



L. to R.: Messrs. R. W. Broadhead, W. Clark Jackson, Col. O. B. F. Planck, Messrs. H. C. Smith, H. E. Bennet, W. A. Lowe, R. P. Chester, A. L. Holton.



Mr. Brian Holmes with the Hon. Sec., Mr. W. R. Edgar.

The following were the results of the various competitions:

1. SILVER SALVER.—Presented by the President of The Institution of Gas Engineers for competition among members—

1st	C. H. Chester	92 − 22 = 70
2nd	R. W. Broadhead	85 − 12 = 73
	J. Watson Napier	82 − 9 = 73

2. THORNTON VICTORY CUP.—For members of the S.B.G.I. only—

1st	C. H. A. Kempton	85 − 12 = 73
2nd	J. C. Woodall	81 − 7 = 74

3. VETERANS' PRIZE (over 55 years of age)—

R Wardell . . . . . 93 − 16 = 77

4. FOURSOMES AGAINST BOGEY.—For prizes presented by D. M. Henshaw, Esq.—

1st	C. H. A. Kempton and F. B. Holmes	2 up
2nd	Capt. Robertson and J. Watson Napier	all square

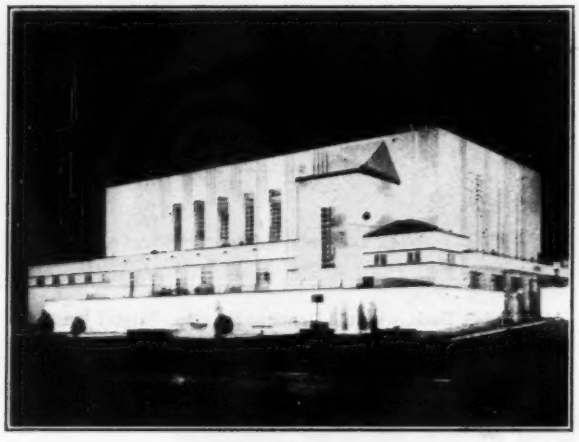
George Wilson Gas Meters, Ltd.

New Works at Leeds

Owing to the greatly increased business in the Northern Area and particularly in Yorkshire, Messrs. George Wilson Gas Meters, Ltd., Foleshill Road, Coventry, inform us that they have found it imperative to open a branch at Leeds for the repair and production of gas meters.

This move will also enable the Firm to give better service, especially in deliveries, as there will be a large stock in hand from which gas undertakings can draw at a moment's notice by telephoning their present Leeds office. In addition to their main Works at Coventry, the Firm now have branches at Manchester, London, Blackpool, and Leeds.

A Fine Piece of Gas Floodlighting



We are indebted to Mr. David V. Reid, Engineer and Manager of the Gourock Corporation Gas Department, for the above photograph, showing the excellent results obtained from an installation of gas floodlighting to illuminate the Craigburn Pavilion, Gourock, on the occasion of its opening.

Atmospheric Pollution

Conference of Local Authorities

Forty-one representatives of local authorities and other organizations co-operating with the Department of Scientific and Industrial Research in the investigation of atmospheric pollution met on May 25 in the half-yearly conference at the offices of the Department. The gathering included representatives from Barnsley, Dagenham, Glasgow, Halifax, Lancaster, Leamington Spa, Leicester, Liverpool, London County Council, Manchester, Newcastle-upon-Tyne, Salford, Scarborough, Sheffield and Rotherham, Southampton, Stoke-on-Trent, Westminster, Willesden, Wolverhampton, the British Commercial Gas Association, the British Electrical Development Association, Messrs. Cadbury Bros., Rothamsted Experimental Station.

In the absence of the Chairman (Councillor Brownhill-Smith, M.V.O., D.L., of Glasgow) owing to indisposition, Dr. H. A. Des Vœux, a past-Chairman, presided.

The Conference received from Dr. G. M. B. Dobson, F.R.S., Chairman of the Atmospheric Pollution Research Committee, a report on the progress of the researches carried out under the Committee. He made the important announcement that the Committee had decided to undertake an intensive survey of the pollution in and around an industrial centre and had selected the City of Leicester, the geographical position of which in relation to the surrounding country and neighbouring centres of population appeared to render it particularly suitable. This proposal had been cordially received by the authorities of the City, who had offered full co-operation.

The Conference noted with interest that the London County Council had intimated that it was extending its investigations and observations in various directions and that it was in particular arranging for observations at a rural institution and a seaside institution belonging to it. Reports from Glasgow and from Sheffield and Rotherham were presented on comparative determinations of sulphur in filtered and unfiltered air, which had been made to assist the Research Committee in its study of experimental methods.

The Conference discussed measures for reducing pollution due to the emission of ash and grit from chimneys. At its previous meeting it had considered a proposal by the London County Council that the machinery of the Conference might be used to secure financial contributions for investigations into means for reducing this type of pollution and had appointed a Committee to meet representatives of the Department for the discussion of practical measures.

Athletic and Social

Stroud Gas Light and Coke Company Social Club

The Annual Outing of the members of the Stroud Gas Light and Coke Company Club took place on Saturday, May 16. Favoured with exceptionally fine weather two coaches left Stroud at 5.30 a.m. en route for Messrs. Ascot Gas Water Heaters, Ltd., at Neasden.

On arrival at 9.30 a.m. the party were welcomed by Dr. Bernard Friedman, Managing Director. After refreshments had been served the members were conducted on a tour of inspection of the Works, where the various stages of manufacture of the well-known "Ascot" heaters were seen. At the kind invitation of the Directors of the Company lunch was served at the Brent Bridge Hotel, Dr. Friedman taking the chair. In a brief speech he said how pleased he was to see his friends from Stroud, and remarked it was indeed a pleasure to him to have them as guests at their Works, and he hoped the visit would prove of great interest to all. Mr. Randall, Chairman of the Social Club, proposed a very hearty vote of thanks to the Directors and staff of the Ascot Gas Water Heater Company for their hospitality, and he said the visit would, without doubt, live in their memory as being one of the most successful outings of the Club since its inception. Mr. Smith, Hon. Secretary, seconded.

Following lunch, the party left for Windsor, where a visit had been arranged to the Castle and grounds. Tea was taken here and the party proceeded by way of Maidenhead and Reading, and eventually reached Stroud at 1 a.m. after a tiring but very happy day.

Willing's Press Guide*

It is with confidence based on a knowledge of the ungrudging effort and care devoted to the preparation of Willing's Press Guide that the publishers present their sixty-third edition.

The publishers believe, and we feel that their sentiments will be whole-heartedly endorsed by all whose work is lightened by the use of this indispensable publication, that the new volume will worthily uphold the standard of excellence set by its predecessors. No effort has been spared in the task of collecting details of new publications and checking existing data; all information has been arranged in the form most convenient for reference. The experience gained over such a long period encourages a continuation of the policy adopted in the past.

A warm welcome undoubtedly awaits the publication, not only among its old friends who have never found it wanting, but among the many new friends it is sure to find.

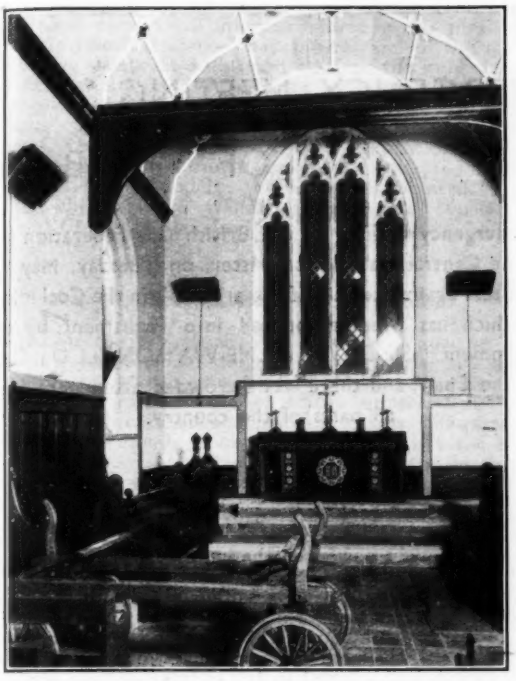
* Willing Service, Willing House, 356–364, Grays Inn Road, W.C. 1. Price, 2s. 6d.

The Gas Light and Coke Company's Bill

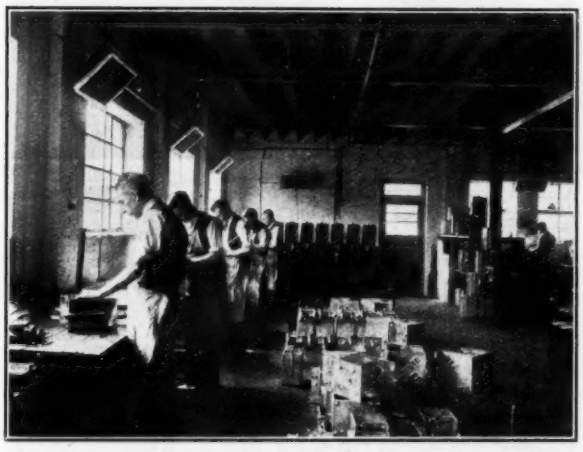
Preamble Proved

A decision was given in regard to this Bill by a Committee of the House of Commons, presided over by Sir John Ganzoni, on Thursday, May 28. We have already reported how the Bill, when before another Committee a few weeks ago, was ordered to proceed, but by an oversight the Chairman of that Committee gave a decision without hearing Counsel for the opponents, although evidence had been heard. Accordingly the Bill was recommitted to another Committee, the proceedings before which have been on the same lines as before the first Committee. ("JOURNAL," May 27, p. 593.)

Sir JOHN GANZONI (Chairman), giving the decision of the Committee, said: We have not found this Bill so simple as we thought it might be at one time, but on balance we have decided, unanimously, that the Bill should proceed in the interests of the tenants, and we find the preamble proved. We are not at all satisfied, however, with what we have heard about the intensive canvassing on both sides. We cannot help feeling that now the parties should put their heads together and endeavour to abate it, even if they cannot stop it, because it is a very serious nuisance to these people who have no choice but to receive unwelcome visits. And we are also not at all pleased with the evidence we have heard of adjusting and re-adjusting the meters so as to ensure that the meter rent shall be recovered from the monies taken from the meters. We feel that the proper remedy for the Company is to cut off the source of supply if the bill is not paid, and we propose to include these two things in our Report to the House.



Applications of the "Portcullis" Radiant Panel



The accompanying photographs show how "Portcullis" high-temperature radiant panel heaters can be used to advantage in buildings of very different character. One illustrates the heaters installed in a Cemetery Chapel on the district of the Ramsgate Corporation Gas Department, while the other shows an installation designed and laid out by the Wandsworth and District Gas Company, at the London Works of George Wilson Gas Meters, Ltd. In the latter installation the heaters shown are in one of the workshops, and it is gratifying to record that during the cold weather last season the workmen expressed their complete approval and satisfaction of this form of heating. Five panels are in use: floor area per panel, 280 sq.ft.

Difficulty was previously experienced in heating the Meter Testing Station at this Works, the temperature of which it is essential to maintain constantly at 65° F. With the use previously of two ordinary radiators this temperature was not attained until the afternoon. One "Portcullis" radiant panel heater was installed, and throughout the last season the temperature was brought up to 65° F. in an hour and easily maintained at that figure for the rest of the day.

Heating by means of these panels situated on the wall 9 to 10 ft. from the floor certainly seems to refute the old belief that to keep the body comfortable it is necessary to warm the feet.

At the Devon Agricultural Show

The Exeter Gaslight and Coke Company had a Stand 70 ft. long by 20 ft. wide at the Devon County Agricultural Show held at Exeter recently.

Representative types of cookers were displayed in various mottled and coloured enamel finishes. A special section was provided of interest to hotel and boarding house keepers. In this a large cooking range in unit construction, hot-closet and carving table with bain marie, and constant boiling water machine were shown in full mottled enamel and chromium finishes. Coloured gas fires, with self-lighting devices in decorative wall panels, attracted much attention. Both storage and instantaneous water heaters were shown in action in the two water heating sections. Several refrigerators were working, and much interest was expressed in the "flame that freezes."

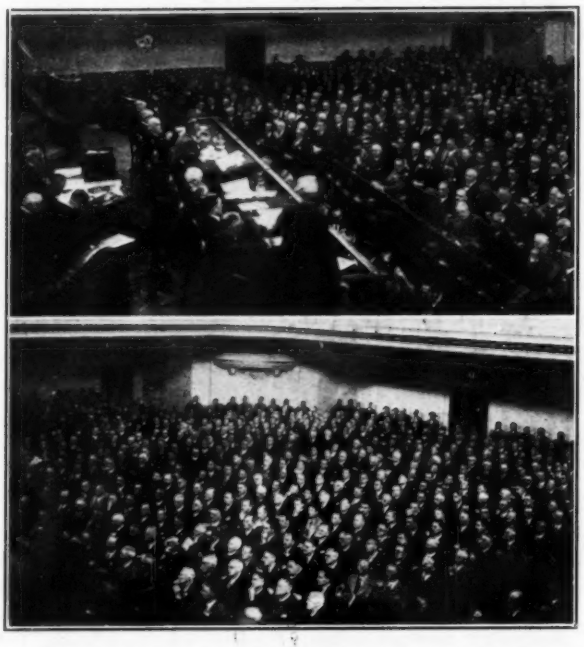
Farmers and Dairymen desirous of supplying Grade "A" milk are required to install sterilizing apparatus, and a moderately priced gas operated model was on view, capable of sterilizing churns, stools, pails, bottles, &c. Of particular interest in this home of Devon clotted cream was a two pan milk scalder made to the design and specification of the Gas Company. A gas operated incubator of 100 eggs capacity, fitted with thermostatic control, was also displayed.

Lighting fittings were all switch controlled, and the public were invited to "Try this switch." Coke grates and boilers were exhibited for use with the Company's graded coke. High-grade sulphate of ammonia also attracted considerable attention.

The majority of the appliances on view were connected, and could be demonstrated in action.

Short cookery demonstrations were held with great success at intervals on each of the three days of the show. These were very well attended, and the opportunity was taken to distribute suitable literature, cookery books, &c.

THE COAL SITUATION



A Portion of the Large Gathering which Attended the Meeting.

EMERGENCY MEETING OF THE B.G.F.

An emergency meeting of the British Gas Federation was held at Central Hall, Westminster, on Tuesday, May 26, to protest against certain of the proposals in the Coal Mines Bill which has been introduced into Parliament by the Government. Sir DAVID MILNE-WATSON, LL.D., D.L., took the Chair, and there was a crowded attendance from all parts of the country.

Sir DAVID MILNE-WATSON, in opening the meeting, said: It is very gratifying indeed to find such a very large attendance representative of the whole of the Gas Industry, which comprises, as you know, all the various organizations now enrolled under the heading of the British Gas Federation, and I am sure that no meeting was ever called in the Gas Industry which was of such vital importance to its future well being as that which you are attending this afternoon. After all is said and done, coal is the basis of our Industry, and when we are talking about coal we are talking about the future well being of that Industry.

In case there should be any confusion in your minds as to why we should be having this meeting here to-day after what has happened in Parliament last Monday and also yesterday, I want to make it quite clear to you that we meet in this hall this afternoon to put the point of view of coal consumers and the Gas Industry, in particular, on the monopoly selling schemes, orders for which are now before the House of Commons. These schemes are set up under the 1930 Act, which, without any further legislative action, operates until the end of next year. I want, therefore, to make it as clear as possible at the outset that the monopoly selling schemes, omitting any effective consumer safeguard, are still before the House, and that the postponement of the Coal Bill (which had to do with colliery amalgamations and the financial structure of the industry) has no bearing upon the future of the selling organizations and the selling schemes which are under a different part of the Act of 1930. In view of possible misunderstanding on these points, it is more than ever necessary that the views of coal consumers should be unmistakably made known.

There is one point that I wish to make very clear at the outset. The Gas Industry is most sympathetic to the case of the coal miners. It is well aware of the difficulties they have encountered in recent years. It fully understands the necessity for measures of regulation and co-ordination which will, by improved efficiency in production and selling, increase the income of the coal industry and enable the payment not merely of better wages to the miners, but of reasonable dividends to the proprietors. So far as the miners are concerned, the sentiments I have uttered are not mere words; some few months ago the Gas Industry agreed voluntarily to an increase in the price of coal on the distinct understanding that the increase went to swell the miners' wage fund. I want, therefore, to put beyond all possible doubt this one point—that in opposing and resisting the present attempt to impose upon all coal consumers a coal owners' dictatorship, the Gas Industry is not to be taken as opposing the betterment of the miners, and national plans for the Coal Industry directed to that end.

But we do not, and never will, accept the view that in order to assist the miners it is necessary to place unrestricted monopoly powers in the hands of the coal owners. On this point I imagine that I speak not merely for the Gas Industry itself and for the other great public utilities—electricity and water—which have been associated with it in opposition to the present plans, but for the entire body of coal consumers of every sort—indeed, for every single section and interest in the country outside the coal industry itself.

The Present Position.

Let me outline very briefly the present position. There are now before Parliament a number of orders for the setting up of regional coal selling schemes. These are in effect strict, rigid, and all-powerful supply monopolies in their various districts, and they pave the way for the ready creation of a similarly rigid monopoly over the whole national fields. These regional monopolies would be able to do a number of things that seem at first sight so incredible that I would like you to listen carefully while I enumerate some of them:

They would be able to tell any person or any body in need of coal that he could have, not the kind of coal that might be suited to his needs (and the needs of coal users are necessarily very varied), but the kind of coal that it suited the monopoly to let him have—and there would be no effective redress against such a decision. Can you imagine anything more monstrous than that?

They would be able to say exactly what pit, in what district, would supply the needed coal. Their decision might be taken irrespective of existing transport facilities and requirements—but there would be no effective redress against it.

They would be able to take two similar loads of an identical quality of coal and to fix different prices for them, simply on account of the fact that one was going to one type of consumer and one to another. I do not stop to argue whether the reason that might be given for the difference would be mere personal whim or some argument such as an alleged difference in the capacity of the buyer to pay—but whatever the reason given there would be no effective redress against the decision. The coal monopoly would remain judge in its own cause.

The monopoly would be entitled, if it encountered any consumer unwilling to accept its dictates as they stood, to refuse to supply—and there would be no effective redress against that fiat. This one point alone is almost staggering in its implications. I challenge anyone, anywhere, to produce a previous instance of a monopoly in an essential commodity set up under statutory authority without even the obligation to supply. Gas, electricity, and water undertakings are all bound down to supply and are also bound down as to the terms of supply, and I venture to say there is no body of traders in the world which should be trusted with a complete monopoly.

Now I think we all understand something of the difficulties with which this Government has been faced in dealing with the coal owners and bringing about some measure of order and improvement in the affairs of the coal industry—difficulties, I might add, which have been encountered not merely by this Government, but by every Government which has made any attempt to face this problem since the collapse of the post-war boom. We understand those difficulties, and we sympathize with them. But I am going to say quite plainly that whatever measures may have to

be taken to lead or induce or tempt the coal owners to accept some measure of internal reform in the interests of the whole country, of the coal miners, and of the owners themselves, whatever additional burdens the public utility undertakings and British industry as a whole may accept—and possibly cheerfully accept—in order to help pull the creaking coal cart out of its rut on to the level road of progress, those measures must not, in the name of democracy, and constitutional procedure, take the form of an unrestricted monopoly. We are not prepared to give a blank cheque which the British nation is expected to sign and to honour, leaving it to the coal owners to fill in the amount.

An Unprecedented State of Affairs.

Incredible as it is, such a scheme as is now on foot, unless it is subjected to the simple safeguards—the simple reasonable safeguards—for the inclusion of which we are asking, will mean a state of affairs unprecedented not merely in constitutional and political annals, but certainly in commercial annals also. It will mean that the State is using its power to put coal users, from the largest to the smallest, exactly where the coal owners want them. We have heard something in this country of the phrase "King Coal"—a phrase that has been used with respect as a tribute not merely to the prestige, but to the basic economic importance of the country's premier industry. But now it seems we are to watch King Coal being turned into a Coal Dictator. We in this country, whether we are individuals or groups or corporations or whatever it may be, do not sit happily under dictatorships, and I profoundly trust that no attempt will be made to start teaching us how.

What I have been telling you may sound to you so fantastic that you may think I am fabricating a story or distorting facts almost beyond recognition. "There must," you will say, "be some other side to this story. There must be some safeguard for the public utilities and other consumers and for the public generally." I assure you that with the exception of something called "Committees of Investigation"—bodies with no judicial status and no effective power to act, no power to do more than ask questions and refer an issue back and forth under an intolerably complex and dilatory form of procedure—with the exception of these practically useless bodies, there is no safeguard against the coal owners' bludgeon except an invitation from the Government to trust the coal owners not to use it.

In fact, the whole answer we have always received from the Government and the coal owners is to trust the coal owners. Well, gentlemen, you know! [Laughter.] You have had some experience of trusting the coal owners. Why, the coal owners do not even trust themselves! They do not trust each other, and yet the Government and the coal owners now say "Trust us. We are not going to do anything wrong in the future." I put it to the coal owners and the Government that if they do not ever intend to do anything wrong, why do they not give us the Tribunal? If you do not intend to do wrong you do not object to penalties, and it is a most suspicious circumstance that they are so anxious to avoid a Tribunal before which they can be called. If they intended to give us consumers of coal fair play they would be only too willing to give us a Tribunal. They asked for a Tribunal themselves last Monday to protect them. They evidently do not trust the Government, and why should we trust them!

In our opinion, that simply will not do. We have every respect for the coal owners, but they are a sectional body with—to put it mildly—no more than the average readiness to sacrifice their immediate sectional interests to wider considerations. Moreover, whatever the point of view of the coal owners, and whatever their record, it would obviously be very bad practice to make them, as a sectional interest, sole judges in a number of important issues between themselves and other interests. This is a point which, in fairness, the coal owners should themselves be the first to admit. In fact, they have shown an extreme sensitiveness on the point when it touches themselves. They have never been asked to accept the verdict of some other sectional body whose immediate interest might not coincide with their own; their protest has actually been against having to accept the verdict of an impartial statutory body unless they were given right of appeal. The Government has shown itself aware of this extreme form of sensitiveness. Surely then we, whose request is the very much milder one that we should be protected by some sort of statutory safeguard against the full rigours of commercial monopoly, can count upon something a little more sympathetic than being told to wait quietly and hope for the best.

Safeguards Asked For.

What, then, do we ask? Something very modest and very reasonable. We ask merely for proper legal and judicial safeguards. Whatever we may think of price discrimination by monopolist bodies, we do not ask that this shall be infallibly prevented—we merely ask that it shall be subject to review by statutory tribunals with power to pronounce against glaring inequities and to enforce their decisions. We ask that this selling monopoly shall be put under the compulsion to supply all consumers with the kind of coal that they need—subject again to safeguards against unreasonable requirements. We do not say that there shall be no increase in prices—we simply say that prices shall be subject to the ultimate jurisdiction of impartial tribunals. The mere existence of these safeguards—these statutory provisions and tribunals—will of itself be sufficient, as everyone acquainted with commercial practice will agree, to ensure that unreasonable terms and exactions will not be made, and that, save in rare and exceptional circumstances, the safeguards will never need to be brought into practical working.

That is what we are asking and what I believe the British public and Parliament itself will feel it right for us to have. We ourselves in the Gas Industry well know and appreciate what it means to exercise powers of a monopoly character under constitutional safeguards. We understand and accept the reason and the need for such provisions. It is a particular irony that we and our brother utility industries which are similarly controlled should be the chief victims of a proposed arrangement for unrestricted monopoly for industrial dictatorship in a basic raw material, especially—and this is the final touch of irony—when that raw material itself competes directly with our own finished product.

We have called this meeting for the express purpose of telling you what some of us, who are in the centre of things, feel about it. We want you to take these things down to the Provinces, and we want you to talk about them in your towns and your cities. We want you to rub it into your Councils because, after all, there is where the power lies. It has been represented to me and to others who have talked to the coal owners and to the Government that we are simply out for dividends and that we simply want to make money. You know perfectly well, however, that we are servants of the public. Our dividends are strictly limited by Acts of Parliament and everything is tied up in every possible way. You know perfectly well that in the long run if prices of coal are forced up, then the consumer is going to suffer, and that is the point you have to take back and speak about in your cities and your towns.

If the coal owners get their own way, and if they propose to go back to the glorious days when they had large dividends of 20 per cent. or 30 per cent. and everything was *couleur de rose*, who is going to suffer? It will be the general mass of the people of this country, the consumers of gas and electricity, and it is that that we want to rub in. We are not speaking here as members of the National Gas Council or whatever it may be, but we are talking in the name of the body of the people who are going to suffer. If we make that clear it will make the Government and the coal owners pay attention, and it is in your power to go back to your districts and tell the facts about this thing and raise such a hubbub that the Government will even at the last moment take action on the lines we are asking. The time is not long, for these Orders will come into operation on July 1 if nothing is done to rouse the country so that in the interests of our consumers we are given the protection we demand. [Applause.]

A Far-Reaching Request.

Sir WILLIAM KAY (Manchester) said it was a great pleasure for him to support the Chairman in a request that must be absolutely far-reaching to everyone in the Gas Industry. Lancashire and Cheshire had already had a dose of what had been mentioned in the form of a selling organization in the coal industry, and therefore he was speaking from experience, coming as he did from Manchester. This selling scheme was the only one in operation at the present time under the 1930 Act, and knowing the effect of it, he could commend every word the Chairman had said as to the results which would follow the Government's latest proposals. That experience had completely confirmed the Chairman's views as to the ill-effects of such monopolies without restriction, for in Lancashire there had been experience not only of price increase, but of refusal to supply the coal required, which careful scientific research had proved to be the most economical in the national interest for the production of gas and coke.

The practical men in the Industry knew what it was to have their work interfered with by having to take material

which was unsuitable. It was a most serious problem that the coal owners should be placed in the position to be able to refuse to supply the quality of coal required and that they could not be challenged by the consumers by way of appeal to a Tribunal. Indeed, the coal owners were under no obligation to supply at all, and the request of the Gas Industry for a Committee to consider such points as these had been met with a positive refusal. The working of the Lancashire scheme had proved that the criticism of the Orders now before Parliament was not mere supposition, but was the result of realistic appreciation of what actually happened under monopolies without safeguards. Therefore he had the greatest pleasure in supporting the Chairman and in impressing upon everybody the necessity for the greatest possible opposition to this shocking attempt at monopoly.

A Well-Timed Protest.

Alderman R. TORTINGTON (Leeds Gas Committee) said his Committee was pleased to take part in this protest. Yorkshiremen, he said, were generally given the credit of being shrewd business men, and they were watching very carefully to see that that privilege was not taken away from them by being deprived of any bargaining power with regard to coal supplies in the future. There was little doubt that the proposed action of the Government in their new Bill would affect all public utilities very seriously, and therefore the public generally, so that this protest was well timed. The Leeds Corporation, having both Gas and Electricity Undertakings, was perhaps in a somewhat different position from some others represented at this meeting, and they appreciated the efforts of the Conjoint Conference in this matter. Both the Gas and Electricity Committees in Leeds felt there was a sense of viciousness and unfairness in the proposals of the Government as embodied in the new Coal Mines Bill, and it was for that reason the Leeds Corporation was represented and willing to lend all possible assistance to the protest now being made. The Selling Agencies which it was proposed to set up would, if the Bill became law, be able to determine the type of coal which gas undertakings should use, notwithstanding that so much scientific work had been done in selecting the right types of coal for the purpose of making gas and coke. If that position came about the Gas Industry would be in a very serious position.

Councillor WALTER MUTER (Convener, Edinburgh Gas Committee) said he was glad to have the opportunity of associating Scotland with the splendid lead which had been given from the Chair that afternoon. Sir David had stated the position beyond any shadow of doubt, and he did not think there was any representative at this impressive gathering who was under any delusion as to the intentions of the coal owners. He was glad Sir David from the Chair had made it so abundantly clear that the public utility undertakings were not attacking re-organization in the coal industry and were not attacking selling agencies *per se*; nor were they attacking the action of the coal owners and the Government of the day in endeavouring to get out of the cockpit of industrial trouble and dispute for all time our greatest basic industry.

A Gross Constitutional Breach.

They were attacking, however, what they regarded as a gross constitutional breach. He himself could not recall, being a keen political and Parliamentary student, any action of any Government which had received so much public condemnation. It was remarkable that in the speeches by the President of the Board of Trade and of the Secretary for Mines and the other speeches which had followed in the debate in the House of Commons little or no attention was given to the public interest, and that was the reason why this meeting had been called. It was urged that whether they represented municipally owned public utility undertakings or privately owned undertakings, they were entitled to say to the Government that they expected protection through the agency of a statutory Tribunal in regard to their requirements and prices, and in the absence of such protection it was very important that they should make their views felt.

He did not know what the intentions of the British Gas Federation were at a later date, but it was highly probable that representatives would have to come to London from all parts of the country and flood the Lobby at the appropriate stage in order to impress their local Members of Parliament with the urgency and importance of this question. In these days of modern legislation, when legislation came tumbling out of that great place at Westminster page by page, some of it very ill-digested and some of it quite useless, and in these complex days, when Members of Parliament had very diversified interests and preoccupation both at home and abroad, it seemed to him that they were quite incapable in many cases of being seized of the importance of the public interest. Legislation had proceeded apace and seemed to justify everything the Lord Chief Justice recently said with regard to the bureaucracy of to-day. Therefore, concluded Councillor Muter, he hoped they would all take every conceivable and practicable opportunity of bringing home to the coal owners of the country that the public utility undertakings of the country were custodians of the rights of the consumer and would always continue to be so.

Major F. J. BYWATER (South Metropolitan Gas Company) said that Dr. Carpenter—who unfortunately was unable to be present—had spent 60 years in the Gas Industry and had never hesitated to raise his voice in the interests of the Industry. Many times during recent years Dr. Carpenter had protested against the operations of the 1930 Act and against the unfairness of them to the Gas Industry, and he felt to-day that unless the Gas Industry and the country roused themselves they would be saddled with a monopoly which would not only hamper prices in the future, but would seriously interfere with the development of the Industry in the future. Personally, said Major Bywater, he had spent a number of years in Newcastle in close touch with the coal owners, and although he hesitated to get into a discussion on such a complicated problem, the fact was that this very serious economic problem had been mixed up with the problem of employment. Redundant mines had been kept at work which in the ordinary course of things would have dropped out of operation. The price of coal had been kept at a high level and the wages of the miners at a low level, and there were no dividends, and it had all been done under the ægis of Parliamentary sanction.

Coal Owners Tired of the Act.

It was no breach of confidence to say that the coal owners of Northumberland and Durham were thoroughly tired of this Coal Mines Act. Under the compulsion of Parliamentary powers they met behind closed doors and fixed their prices, and they were able to inflict penalties on anyone who sold any coal below those prices. They also discriminated against the Gas Industry in favour of their own coke ovens and, in fact, they could do anything they pleased. These operations had been going on for five years and they were being very much intensified by the cessation of competition of any kind whatsoever—inter-district competition and inter-colliery competition. There was now one huge monopoly in this area, and in case there should be any leakage it was now proposed to have a Central Authority in London to correlate the whole business, and the gas and other industries were asked quietly to sit by and wait for Parliamentary sanction.

There was now another batch of Orders lying on the Table of the House of Commons, and if they were not removed by July 1 they would become law, and then a huge monopoly would be set up all over the country. The Industry had done everything it could so far. Representatives of the Industry had seen the Minister of Mines on several occasions and the coal owners had been seen, but no redress had been secured in any shape or form. Therefore it was now a matter of carrying the agitation to the country and trying to persuade local Members of Parliament through the municipal and other undertakings to take strong action in the direction desired.

Finally, Major Bywater said there was one thing he wished to bring very definitely forward, and that was that a subtle and insidious background had been given to the new Bill in discriminating against the Gas Industry by suggesting that the Gas Industry had not been paying a fair price for its coal. But everybody present knew that that simply was not true. [Hear, hear.] The Industry had paid a fair price for its coal, and it should be brought prominently forward in this agitation that the Industry was not asking for any favour at all; it was simply asking for protection and fair play.

The Manufacturers' Viewpoint.

Mr. H. JAMES YATES, speaking from the manufacturing side, said he could give one instance in which the position which would arise under the new Coal Mines Bill would seriously affect the business of his organization. They used a very large amount of coal during the year in furnaces for the production of enamelled goods, and it was of the utmost importance to have a particular fuel to suit that purpose. If they were dictated to and had to take fuel which was unsuitable, they would be unable to produce a kind of enamel which would be of any use so far as length of life was concerned. He could also raise many other points in connection with the various processes in the business of his organization, but suggested that the one he had referred to sufficiently illustrated the importance of not being dictated to as to the type of fuel that

should be bought or the place from where it should be obtained.

Mr. WILLIAM CASH said the reason he had been asked to say a few words was that he happened this year to be Chairman of the Conjoint Conference of Public Utilities Association, which comprised representatives of gas, water, electricity, trams, and hydraulic power, all of whom were, of course, consumers of coal; and while this meeting was a meeting of the Gas Industry he could say that there would be a further meeting held under the auspices of the Conjoint Conference. He also understood that the electrical people were holding a meeting on their own, so that the public utilities were at one in this matter, which was of some importance, so that it might not be said that they as gas men had only the interests of the Gas Industry at heart.

Continuing, Mr. Cash said he would like to sum up in a few words the case which Sir David had put so clearly before them. What were the objects of this meeting, and what was it they really wanted? They wanted the quality of coal necessary for their business secured to them; they wanted no unfair discrimination against public utilities. By that he did not mean to say that they were necessarily to have their coal at the cheapest price supplied to anybody, but they did object to any method of discrimination against public utilities or founded on the fact, as some people seemed to imagine, that the price of coal was a matter of no importance to the public utilities because it could be passed on. It was true in one sense that it could be passed on; but that involved the consumer, and that was where they did quite reasonably claim to represent the consumer in these representations which they desired to press on the Government and the coal owners.

A Tribunal Required.

They also wanted the Tribunal which had been referred to, and they wanted that Tribunal to be effective and to have access to prices which were, in fact, being charged, because if the public utilities were going to allege they were being unfairly charged they would want to know what other people were being charged. Moreover, they wanted this Tribunal to have executive powers. Up to the present they had had no effective answer to their requests, either from the Government or the coal owners. In fact, so far as he understood the position, the owners merely said: "Trust us and we shall treat you fairly." They had heard what Sir David Milne-Watson has said on that matter. If they were such fair and generous and reasonable people, what possible objection could the coal owners have to a Tribunal being set up to investigate these matters if there was any idea that the public utilities were not being properly treated?

Sir David had spoken of the dangers of setting up an uncontrolled monopoly. In that connection reference could be made to the railways, and there they had the Railway Rates Tribunal to which the trader could appeal. Gas and electricity supply were quasi-monopolies, but not actual monopolies, because of the competition between them. Moreover, the Gas Industry was controlled both as to the quality of the gas supplied, the price at which it was supplied, and the dividends which could be paid. If that was proper teatment for the Gas Industry—and they did not complain—then they saw no reason why the Gas Industry should not be given similar protection against this proposed coal monopoly.

Mr. Cash said it should be made known as widely as possible to the public exactly what the Orders now lying on the Table of the House of Commons really meant. He had one of these Draft Orders with him, and the following paragraph from it indicated clearly the scope of these Orders:

> "For determining in the manner specified in the scheme the markets in which and the persons or class of person to whom the owner of each coal mine in the district may sell or supply coal from his coal mine, and for controlling in manner so specified the terms and conditions of any contract for the sale or supply of such coal by such owner, including . . . the terms and conditions relating to the tonnage and class or description of coal to be supplied, the price thereof, the period within which it is to be supplied, and, in the case of coal supplied for re-sale by the buyers, the market or areas in which and the terms on which the coal may be re-sold; and for controlling the amount of any commission or allowance given by the owner of a mine under any such contract; and to ensure, so far as may be necessary for the purpose of the scheme that the terms and conditions of such contract are performed and enforced."

And, said Mr. Cash, there would be no appeal by the consumer! Was that fair; was that just; was that English, he asked? The Gas Industry suggested it was not, and therefore it was necessary to continue this protest to see that this thing did not go through. He spoke as a user of coal to some substantial extent, and he also had the honour to represent in a measure several important public utility undertakings. For all these reasons he heartily supported the suggestions made by the Chairman and the resolution which was shortly to be put to the meeting.

Mr. GEORGE HELPS (Nuneaton), referring to the suggestion sometimes made that the Gas Industry could pass on the increased charges to the consumer, said he could imagine circumstances in which this could not be done. Coal was being sold to electricity undertakings at shillings per ton less than the coal supplied to gas undertakings, and that was an important factor preventing the passing on of the increased price of coal to the gas consumer. Although the Gas Industry at the present time was only using about 20 million tons of coal per annum, they might very soon be requiring 40 million tons, and he would very much like to know the hidden hand behind these marketing schemes, because the more that was known in that way the better the schemes could be fought. He suggested it might be worth while for the Gas Industry to consider buying a colliery or two. He did not see why that should not be done; money was cheap at the present time, and why not get on with it?

Action in Salford.

Alderman J. H. KEARNS (Chairman, Salford Gas Committee) said it was beyond his comprehension why so many delegates should have been brought to London to be asked to do what Salford had already done. It had been suggested from the platform that this matter should be taken up in the districts, and Salford had already taken action of that kind. As an instance of the effect of the Lancashire and Cheshire Selling Scheme, he said that recently the Salford Gas Committee had to go into the question of coal supplies, and found itself in the hands of the Lancashire and Cheshire coal owners, who asked from 2s. 6d. to 3s. extra on the prices of the existing contracts. Quotations were then obtained from Yorkshire, which were lower, and the contracts were placed in Yorkshire, although the Committee was criticized for doing so. If, however, the new Bill went through there would be no difference in the price of coal from Lancashire, Yorkshire, or anywhere else. Therefore, in Salford, they had approached their local Members of Parliament and had supplied them with copies of everything that had passed at the meetings of the Conjoint Conference of Public Utility Undertakings, and they had already been assured of the assistance of the three Members for Salford. Every effort should be made that the first essential should be representation from the public point of view and not from the owners' point of view, and in view of what had been said from the platform, he was a little surprised that action on the lines suggested, and already taken by Salford, had not been taken generally throughout the country. The people of Salford had been definitely told that if this Bill became law the charges for gas and electricity must be increased, and he hoped that line of action would be taken by representatives of the public utilities throughout the country.

The CHAIRMAN pointed out that the Lancashire and Cheshire scheme was the only one so far in operation. The others had been Tabled in the House of Commons. Continuing, he pointed out that this meeting was the culmination of long negotiations, and it was necessary to carry on negotiations in an endeavour to arrive at a peaceful settlement before contemplating public meetings. They had seen the Minister of Mines and the coal owners over and over again, either privately or as deputations. Promises had been made that consideration would be given to the matter, and it was only just and right that the answers should be waited for. The Gas Industry was now in a position to say that these answers were unsatisfactory; hence this meeting. Sir David repeated that the Gas Industry had no monopoly, and that it was in the interests of the citizens of the country these protests were being made. Therefore, he again urged that the strongest possible protest should be made against any attempt to create a monopoly in the most completely basic raw material in this country.

In conclusion, Sir David moved the following resolution:

> That this meeting of the British Gas Federation, having heard the statements made by Sir David Milne-Watson and others, including representatives of the Cities of Edinburgh, Leeds, and Manchester—
>
> (1) Demands that
>
> (*a*) provisions for the adequate protection of coal consumers should be introduced into the Monopoly schemes which are now being prepared; and

(*b*) in particular these monopolies should be under obligation to supply coal of a quality reasonably required by the consumer; and

(*c*) impartial and independent tribunals with effective powers should be set up in each district, to which aggrieved consumers could appeal, whether the coal be required for gas, electricity, water, or any other industrial or domestic purpose.

(2) Pledges itself to use all legitimate means to rouse public opinion as to the necessity of the above-mentioned safeguards.

Sir WILLIAM KAY (Manchester) seconded the resolution, which was carried unanimously.

On the motion of Mr. F. H. JONES, the meeting accorded a hearty vote of thanks to Sir David Milne-Watson for presiding.

Women's Gas Council Hold First Annual Meeting

Between four and five hundred members from all parts of the country attended the First Annual General Meeting of the Women's Gas Council, which was held at Londonderry House, Park Lane, W. 1, on Tuesday, May 26 last.

In the unavoidable absence of the President of the Council (the Marchioness of Londonderry, D.B.E.), the chair was taken by the Dowager Lady NUNBURNHOLME, J.P., who is one of the Vice-Presidents.

The CHAIRMAN, in opening the proceedings, referred with regret to the absence of their President and expressed appreciation of her kindness in lending her house for the holding of their first Annual General Meeting.

The Annual Report.

Miss K. M. HALPIN (the Organizing Secretary) read the First Annual Report, for the period June 1, 1935, to March 31, 1936, and the following points of interest are reproduced therefrom.

The work of the first few months has necessarily been of a two-fold nature—first, the establishment of the Council as a National Organization in a position to affiliate with other organizations working for and among women; and, secondly, the formation of local branches and affiliated associations to carry on the work of the Council throughout the country. The Council has affiliated to the National Council of Women (on whose Housing and Household Service Committees it is represented); the National Women Citizens' Association; the Women's Employment Federation; and the League of Nations Women's Advisory Council; while other bodies with which it has co-operated during the year are the National Union Townswomen's Guilds; the Housing Centre; the Association of Teachers of Domestic Subjects; the Federation of Working Girls' Clubs; the National Council of Girls' Clubs; the Smoke Abatement Society; the National Safety-First Association; the Battersea Polytechnic; and the Cardiff Domestic Science College. In addition, the Women's Gas Council was represented at the Sixth International Congress for Scientific Management and at the recent B.B.C. Conference.

A panel of suitable lecturers, willing to speak to branches, has been built up for the benefit of Branch Secretaries, and is constantly receiving additions.

A neat and attractive badge has been produced for the use of members of the Council, and this is included in members' subscription. The publication of the Women's Gas Council Magazine has had to be postponed owing to pressure of work connected with branch organization; but an Editor has now been appointed, and the first number is anticipated in the early autumn.

The Council was asked to assist the National Council of Women Research Committee in providing gas exhibits for a section of the Exhibition held in connection with the British Association meeting at Norwich. The whole Exhibition was later transferred to British Industries House, London, where it attracted considerable attention. The Council was also consulted in connection with the appropriate gas cooking installation for a Housing-the-Old Exhibition organized by the Housing Centre in January last. The Council had a stand at the Exhibition of Women's Progress held at Sunderland House last March, and showed a modern kitchen unit as a background to a literature stand.

A considerable number of districts have been visited, and in all cases local branches are under consideration. To Harrogate goes the honour of being the first branch to affiliate, while Swindon and Exeter have affiliated their existing organizations and Birmingham has formed a branch within their original Ladies' Circle. Twenty-three branches have been formed, while inaugural meetings have been arranged for four others.

Training of Demonstrators.

A small Sub-Committee met on Oct. 24, 1935, to discuss the proposal that a syllabus should be prepared and sent to Education bodies setting forth the requirements for demonstrators in the Gas Industry. This Committee urged the need for some more definite system of training to follow the course in Domestic Science and Cookery which must be the background of the demonstrator's training. They recommended that some course be instituted to enable fully-trained Domestic Science Students to qualify in Gas Cookery Demonstration and that a diploma be issued by the Women's Gas Council, to candidates who have had practical experience with a Gas Undertaking, and pass an examination in this subject.

Through the co-operation of Miss Masters, an experimental course was started at the Battersea Polytechnic in the Spring Term, and Miss Godfrey, of the Gas Light and Coke Company, London, was appointed lecturer in Gas Cookery Demonstration. The course proved very popular and is being continued this term, while it is now planned to extend the course to two evenings a week covering two if not three terms starting from next September, so that students taking their Cookery training can attend this more comprehensive evening course at the same time, at the end of which it will be possible for them to take an examination which will qualify them for the diploma after further practical experience.

Other Colleges have shown their interest in this scheme and it is hoped that it will be extended outside London.

Details of the proposed Summer School to be held at the Cardiff Domestic Science College from Sept. 11 to 15 are now available, and nearly every place has been filled. It is anticipated that this will not only be instructive, but should be of the greatest help to demonstrators in affording them an opportunity of meeting and discussing their work and problems.

The Executive Committee, concludes the Report, feel that the real enthusiasm of all members in the first year's work is a great encouragement for the future, and promises a rapid development of the Council's activities.

Moving the adoption of the Report, Mrs. FRED. TAYLOR remarked that membership of the Women's Gas Council would be of advantage to all progressively-minded women in the advancement of the welfare of their homes, in the up-bringing of their children, and in the general betterment of the women of the nation. Personally, she was amazed at the Council's progress. In her own area of Altrincham, for instance, where they had been going four months, they had already enrolled 130 members in the course of their four meetings, and the atmosphere at those gatherings was really wonderful.

The Report was unanimously adopted, as also was the statement of accounts, which showed the Council to be in a sound financial condition.

Officers and Committee.

The Marchioness of Londonderry was unanimously re-elected President of the Council, and the CHAIRMAN OF THE EXECUTIVE COMMITTEE (Miss Wolseley-Lewis) stated that

all the Vice-Presidents were willing to stand for re-election. They were therefore re-elected as follows:

Miss Adler, J.P.	The Countess Jellicoe
Mrs. W. A. Cadbury	The Countess of Limerick
Lady Chatterjee, O.B.E., M.A., B.Sc.	Sir David Milne-Watson, LL.D., D.L.
Lady Davis	Lady Steel-Maitland
Lady Emmott, J.P.	The Rt. Hon. Lord Moynihan, K.C.M.G.
Mrs. A. S. Giles	
Sir Francis Goodenough, C.B.E.	The Dowager Lady Nunburnholme
Lady Humphries	Sir Isidor Salmon, C.B.E.

The following additional Vice-Presidents were also elected:

Lady Duckham	Lady Sydenham of Combe
Miss Faithfull	Lady Woodward

The ballot then took place for elections to the Executive Committee, and the following ladies were elected:

Lady Ruth Balfour	Mrs. Eileen Murphy
Mrs. Cottington Taylor	Mrs. Roberts
Miss Crawford	Mrs. L'Epine Smith
Miss Francis	Mrs. Fred. Taylor
Miss Humphries	Miss Webster
Mrs. Iredale	Miss Willans, M.B.E.
Miss Kirkby	Miss Ellington-Wright, M.B.E.
Miss Mathias	

A number of alterations to the Rules and Constitution of the Council were then submitted and approved, Miss WOLSELEY-LEWIS briefly explaining in each case the reason for the suggested amendments.

The Council's Auditors (Messrs. Cash, Stone, & Co.) were duly re-appointed for the ensuing year.

Miss WOLSELEY-LEWIS thereafter proposed a hearty vote of thanks to the Dowager Lady Nunburnholme for coming at great personal inconvenience to take the chair on that occasion. They could not have found any of their Vice-Presidents better qualified to preside over their meeting. She was a perfect Chairman, and they were fortunate to have secured her for their First Annual General Meeting.

The vote of thanks was heartily accorded, and the CHAIRMAN, in acknowledgment, said that it had been a great pleasure to her to deputize for her old friend Lady Londonderry, and it had been a privilege and honour to meet all of them.

Tea was subsequently provided, and a number of members of The Institution of Gas Engineers, whose Annual Meeting was taking place concurrently, took the opportunity of visiting Londonderry House to support the meeting of the Women's Gas Council.

The Council's Progress.

After tea, Miss HALPIN gave a short Address in which she outlined the aims and objects of the Women's Gas Council and drew attention to the progress made during the period since their inception.

The Women's Gas Council, she said, came into being in May last year because it was necessary to have some national body which could represent the millions of women throughout the country who used gas in their homes. Their potential membership was accordingly enormous, and the objects of the Council were to form a platform on which those women could put forward their ideas and experience and which would make them of inestimable value as an advisory body of people who were experts at their own job—which was the home—that was, an advisory body of home experts who by pooling their ideas could perform much constructive work and could bridge the gulf between the scientist and the housewife and link the manufacturer with the consumer.

Secondly, this interchange of ideas and discussions on matters appertaining to the home was instructive and at the same time enjoyable to the busy housewife whose time was precious but who had a yearning for information on the latest developments which modern science could provide. They gave her an opportunity of studying these problems connected with scientific home management and at the same time of meeting her friends in a sociable way. By this means the practical questions of the day could be studied and given their proper place in the housewife's vision, and she was enabled to see these outside problems as they affected her home and the homes of others.

It was the housewife's voice on Government and Public Committees engaged in problems and questions affecting women such as housing and welfare work generally; and it was the means of collecting and distributing information about gas as it affected the home, child welfare, hygiene, housing, slum clearance, and smoke abatement—all subjects of vital importance to women.

Their branches, which were run by a Committee, met regularly for discussions on any topics of interest to the housewife; hence some were specializing in home furnishing, interior decoration, others in nutrition and dietetics, while the health of the family also had a place in the scheme of things. Thus it would be seen that this was something more than a women's Council; it was, in fact, a social service which a great Industry offered its women clients.

By affiliating with other women's organizations they not only kept their members in touch with all that was being done by women and for women to-day, but they took their part in discussion on those subjects affecting the housewife, and as they grew in number they would represent an ever increasing section of public opinion.

The average woman spent the majority of her life in her home, and their endeavour was to make the science of homemaking so attractive an art that the general standard of living might be raised throughout the land to the high standard which already existed in some parts of the country, and at the same time assist in the task of helping the working-class housewife to get the best value for her money, showing her how to buy economically and cook appetisingly on the small amount of money available.

The Gas Industry, concluded Miss Halpin, gave the women of England the hospitality of its premises and the benefit of its organization in an attempt to enable the housewives of this land to make their homes the delight and joy they could be when much of the drudgery and monotony of tasks performed under old fashioned methods was eliminated—and so enable them to have leisure to perform the double duty laid upon them to-day of being good housewives and at the same time taking their places as citizens of an Empire which badly needed their help.

Germany Teaches Housewifery.

An interesting Address was then given by an English-born lady who for fifty years had been resident in Germany, in which she described the steps that were being taken to re-institute German women in their former position as "models of housewifery."

Chiefly owing to the war and its lamentable results, she said, the German housewife was losing all interest in her home and family and was growing careless, extravagant, and lazy. Something had to be done. In came a new Government and a Ministry of Women was established. In a very short time arrangements were made for the domestic training of girls leaving school. The plan was actually a kind of school extension consisting of a year's domestic tuition. She could not say it was popular—compulsion was never popular—but as it was a duty to the nation and to themselves it would soon be shouldered as a matter of course.

With this aim in view 10 preparatory schools were training sufficient domestic teachers for the masses of girls leaving school each year. To-day, 10,000 to 12,000 girls were placed in private families as apprentices for a term of a year.

The girl of *13* from the Elementary School was placed in a family for a year, girl and mistress being given a 6 weeks' trial before settling down for the year's apprenticeship. There were no wages, but 6 marks a month were given as pocket-money. A lady inspectress kept her eye on the girl and visited the family from time to time.

The next grade was that of the girl of *15* of the higher school who was going in for civil service, secretarial, municipal, or nursing work, or for teaching in domestic colleges. She took a three years' course in a "Frauenschule."

The third class consisted of those who were going in for academical study and were in possession of their degrees. They had six months' training only. All three classes finished up with a certificate for "proficiency in housewifery."

The elementary girl might, like her sisters of the higher schools, pick her calling, or remain in domestic service, drawing, *after* apprenticeship, full wages. It was not considered advisable to place these young schoolgirls in families having no other domestic aid, and preference was given to those families possessing an elder maid, or where the mistress worked together with the girl and the family was small. Great care was taken that the girls did not overwork their strength.

The inspectress soon found out if things were not as they ought to be, and immediately regulated affairs. On the whole, results were satisfactory, and the idea was slowly gaining ground.

A short discussion followed, in which several ladies asked questions of the speaker, after which a hearty vote of thanks was accorded to her on the proposition of the CHAIRMAN, who remarked that they had all been extremely interested in the new light which she had thrown upon the important question of training girls.

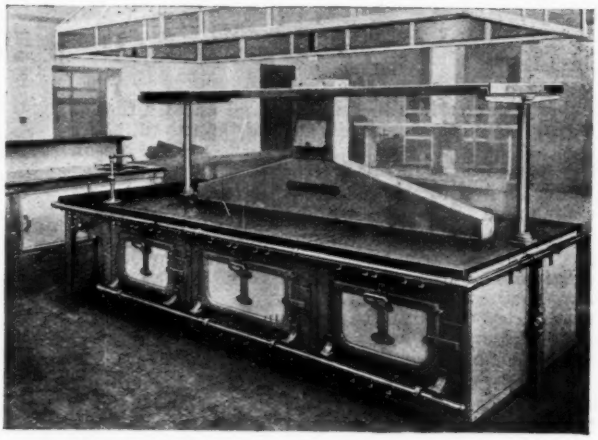
The meeting then terminated.

By Appointment

CARRON GAS-HEATED CENTRAL RANGE

A most efficient Gas-heated Range. Externally heated Ovens. Solid flat top hotplates. Body adequately insulated. Bain Marie at end. Black or vitreous enamelled finish.

Illustration shows Carron Gas-heated Central Range, having six ovens, fitted in the Kitchen of a London catering establishment.



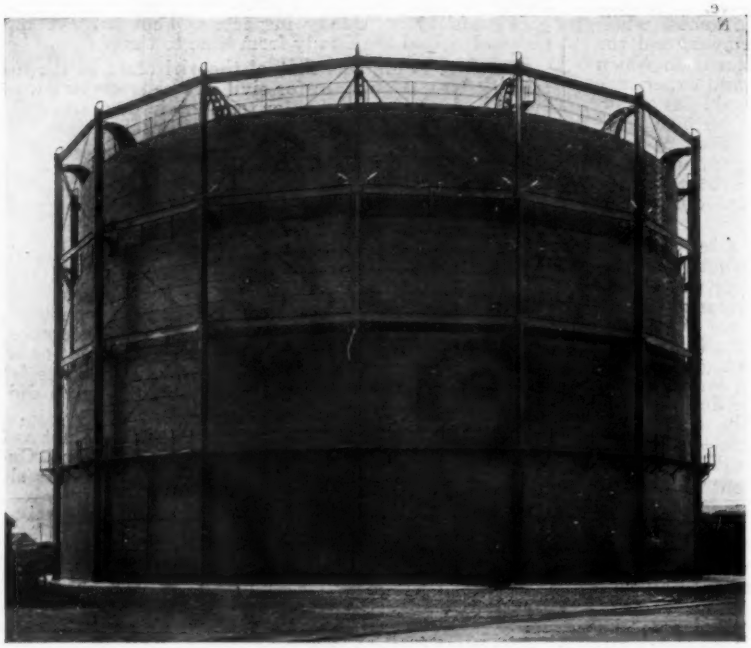
Drawings and Estimates Gratis. Gas Cooking Apparatus Catalogue, No. 6G, post free.

CARRON COMPANY
Works: CARRON, FALKIRK
London: 15, Upper Thames Street, E.C. 4
Liverpool, Glasgow, Edinburgh, Bristol

FIRTH BLAKELEY, SONS & CO., LIMITED

GAS AND CONSTRUCTIONAL ENGINEERS

VULCAN IRONWORKS, CHURCH FENTON, LEEDS



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ALSO
"TAMWORTH" CALORIFIC-VALUE CONTROLLER.

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

With the approach of the Whitsuntide holiday and other obvious counter attractions the Stock Exchange did not anticipate a very busy time last week; but despite the general slackness most markets closed firm and steady. A feature was the revival of interest and consequent hardening of prices in the gilt-edged market—though this is not uncommon when the War Loan interest is due. Home rails weakened at the opening and closed without further change. Industrials were patchy with here and there some good features notably British Oxygen and Cerebos shares. The long account finishes during the current week, after which a return to more active conditions is anticipated.

Despite the falling off in the volume of business in most sections the support for gas stocks and shares was about comparable with that of the previous week and prices with few exceptions remained unaltered. There were only five changes in the Official List which included a further rise of a point in the Montevideo stock on the dividend announcement. This will be 1½%, making 3% free of tax for the year 1933, while a further similar rate is to be disbursed, half to be paid on July 8 next and the other half when funds are available. South African £10 shares also hardened again and closed ½ up at 4½. The Supplementary List provided the highest increases with Hampton Court gaining 3½ points to 175½, business being done at 177½, and Yorktown rising 3 to 132½; the yields at these prices work out at £4 2s. 8d.% and £4 14s. 3d.% respectively. At the Provincial Exchanges Bristol 5% debenture was marked up 1 to 127½, but Sheffield consolidated dropped a similar amount to 147½. It should be noted, however, that on the London Exchange, where prices are as a rule a few points lower than those on the local Exchanges, business in the Sheffield stock was recorded last week at 148.

The Wandsworth new 4% preference is now officially quoted and has therefore been transferred from the Supplementary List. The new 5% preference of the Portsmouth Company has also been added to the Official List though the opening quotation of 130-135 is high when compared with similar stocks of larger undertakings.

Current Sales of Gas Products

The London Market for Tar Products.

May 30.

There are no changes to report in the prices of tar products, which remain as quoted on the 25th instant.

Tar Products in the Provinces.

May 30.

The average prices of gas-works products during the week were: Gas-works tar, 20s. 3d. to 25s. 3d. Pitch—East Coast, 35s. to 37s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 35s. to 37s. 6d.* Toluole, naked, North, 2s. 2d. to 2s. 4d. Coal-tar crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5½d. Heavy naphtha, North, 1s. 1½d. to 1s. 2½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4⅜d. to 4⅞d.; low gravity, 4⅜d. to 4⅝d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 2s. 4d. to 2s. 6d. Naphthalene, £22 to £24. Salts, 100s. to 105s., bags included. Anthracene "A" quality, 3d. to 3½d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *May* 30.

Business still continues rather restricted for want of prompt supplies of the finer products. Prices in all departments, with perhaps the exception of pitch, are firm.

Crude gas-works tar.—The actual value is 34s. to 35s. per ton *ex* works in bulk.

Pitch remains unaltered meantime at 35s. to 37s. 6d. per ton f.o.b. Glasgow for export, and 35s. per ton *ex* works in bulk for home trade.

Refined tar.—While quite considerable quantities are changing hands, there is not so much activity as is anticipated at this time of the year. Quotations remain at 3d. to 3½d. per gallon f.o.r. for export, and 3¾d. to 4d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—A steady throughput is maintained at the following prices: B.E.S.A. Specification, 5¼d. to 5⅜d. per gallon; low gravity, 5¼d. to 5½d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—This is a strong feature and available supplies, which are relatively small, command not lower than the following prices: Pale, 97/99%, 1s. 10d. to 2s. per gallon; dark, 97/99%, 1s. 8d. to 1s. 10d. per gallon; pale, 99/100%, 2s. 3d. to 2s. 6d. per gallon; all *ex* works naked.

Crude naphtha.—Only small quantities are available and values are steady at 5½d. to 5⅝d. per gallon, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 5½d. to 1s. 6½d. per gallon, and 90/190 heavy naphtha is 1s. 1d. to 1s. 2d. per gallon.

Motor benzole is available at 1s. 3½d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 5s. to 5s. 6d. per gallon, and 90/140 grade is 5s. 6d. to 6s. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	8½	to	0	9	per gallon at works
Motor ,,	1	2	,,	1	2½	,, ,, ,,
90% ,,	1	3	,,	1	3½	,, ,, ,,
Pure ,,	1	7	,,	1	7½	,, ,, ,,

Contracts Advertised To-Day

Coal.

Brigg Gas Department. [p. 740.]
Severn Valley Gas Corporation, Ltd., and Gas Consolidation, Ltd. [p. 740.]

Coke Storage Hopper.

Middleton Gas Department. [p. 740.]

Exhauster and Steam Engine.

Dewsbury Gas Department. [p. 740.]

Paint.

Southport Gas Department. [p. 740.]

Painting.

Southport Gas Department. [p. 740.]

Retort Repairs.

Burton-on-Trent Gas Department. [p. 740.]

Tar.

Brigg Gas Department. [p. 740.]

Trade Notes

The Drayton Armstrong Steam Trap Book.

A useful handbook has just been published by the Drayton Regulator and Instrument Company, Ltd., of West Drayton, Middlesex, on the subject of steam traps. While dealing particularly with the Drayton-Armstrong steam trap, the publication has a very useful section dealing with the subject in general.

Solving Coke Problems.

An attractive publication has recently been produced by Messrs. Robert Cort & Son, Ltd., Reading Bridge Ironworks, Reading. The front cover of this booklet has been executed by the famous Heath Robinson, who gives his solution to the problem of coke grading, which, with its seemingly endless number of humorous little details, will make a ready appeal to those interested in the subject. Despite the light vein of the cover, the contents of this publication are set out in a businesslike manner and deal with the Firm's plant for cutting, grading, debreezing, conveying, and screening coke. Very liberally illustrated, this book should provide the Gas Engineer, whatever the size of the Works under his charge, with the particular coke plant he requires. The Firm's plant has been installed at over two hundred gas-works up and down the country as well as at almost forty by-product coke ovens.

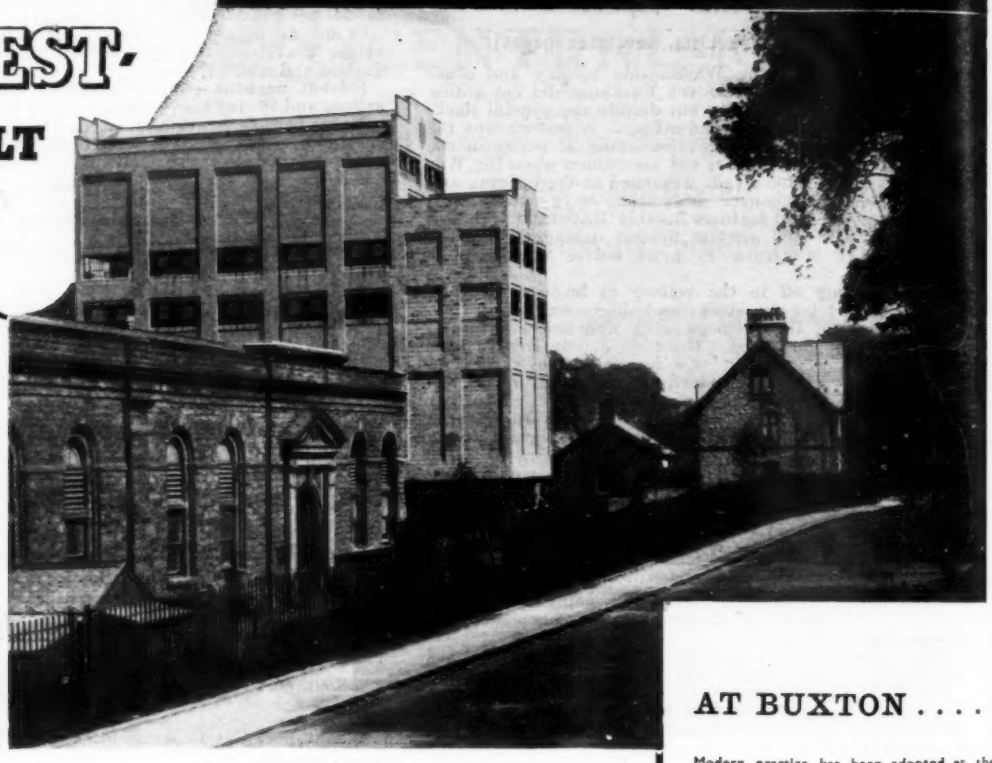
Gas Undertaking Result

Rochdale.

The Rochdale Corporation Gas Committee had before them on May 20 the results of the Department's trading during the financial year ended March 31. After placing a sum of £4,000 to the renewals fund there is a net profit of £4,165, as compared with £3,999 in the previous year, an increase of £165. The Committee decided to place £1,500 of the surplus to working capital, and to add the balance of £2,665 to the reserve fund, which will then stand at £9,094. The total income for the year was £159,517, compared with £151,832 in the previous year. The receipts from the sale of gas show an increase of £1,228 and from the sale of residuals an increase of £4,544. During the year the Department sold nearly 22 million cu.ft. more gas than in 1934-5, an increase of approximately 3·6%.

MODERN PRACTICE AT ITS BEST

WEST-BUILT



AT BUXTON . . . .

Modern practice has been adopted at the works of the Buxton Corporation Gas Department in the form of the new Glover-West vertical retort installation and coke cutting and grading unit illustrated above. The plant comprises eight retorts and began service toward the end of 1935. Breeze-burning producer equipment and a waste-heat recovery unit are incorporated.

Since the 1935 Institution Meeting carbonizing plants of WEST design and construction have been started up or put in hand in Gt. Britain and Ireland, Australia, S. Africa, Denmark, France, and Spain.

New Installations of Glover-West verticals have been put into commission for the **Llanelly** Gas Light Company, the **Stratford-upon-Avon** Corporation Gas Department, the **Slough** Gas and Coke Company, the **Kilsyth** Corporation Gas Department and the **Buxton** Corporation Gas Department, and extensions to similar plants for the **Buckhaven and Leven** Gas Commissioners, the **Montrose** Gas Company, Ltd., the **Manchester** Corporation Gas Department (Rochdale Road Station), the **Johannesburg** Municipal Gas Department and the **St. Helens** Corporation Gas Department. Installations of Westvertical chambers have been put into service for the **Watford and St. Albans** Gas Company and the **Willenhall** Gas Company.

Orders for Glover-West Vertical Retort plants received since the 1935 Institution Meeting are in hand for the Gas Undertaking of **Mataró**, Spain, the **Newry** U.D.C. Gas Department, the Gas Undertaking of **Vannes**, France (3rd order), the Gas Undertaking of **Tarbes**, France (2nd order), the **South Brisbane** Gas Company, Australia (2nd order), the **Salford** Corporation Gas Department (2nd and 3rd orders), the **Wellingborough** Gas Light Company, Ltd., the **Romford** Gas Company (5th order), the **Dudley**, Brierley Hill and District Gas Company (3rd order), the **Kelso** Gas Company, Ltd., the **Altrincham** Gas Company, the **Bilston** Gas Light and Coke Company (2nd order), the **Grangemouth** Corporation Gas Department (2nd order), the **Johannesburg** Municipal Gas Department (3rd order), the **Ballymena** U.D.C. Gas Department (2nd order), and the **Yeadon** and **Guiseley** Gas Company (2nd order).

THE WEST SYSTEMS

GLOVER-WEST VERTICAL RETORTS • WESTVERTICAL CARBONIZING CHAMBERS • WEST FUEL PLANTS

WEST'S GAS IMPROVEMENT COMPANY, LTD.

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MEMBERS OF THE SOCIETY OF BRITISH GAS INDUSTRIES.

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations May 29.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Mar. 16	7	7⅛	Alliance & Dublin Ord. ...	150—160	...	...
374,000	,,	Dec. 16	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
557,655	,,	Feb. 17	7	7	Barnet Ord. 7 p.c. ...	167—172	...	...
300,000	1	Mar. 30	1/4½	1/9½	Bombay, Ltd.	1½—1⅝	...	26/9—27/3
179,305	Stk.	Mar. 2	9½	9½	Bournemouth sliding scale ...	218—228	...	220
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	170—175	...	171—172½
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	148—153	...	149½
50,000	,,	Dec. 16	3	3	Do. 3 p.c. Deb. ...	85—90	...	89½
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	105—110	...	109½
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	125—130	...	124
357,900	,,	Feb. 17	7½	7½	Brighton, &c., 6 p.c. Con. ...	170—175	...	...
649,955	,,	,,	6¾	6¾	Do. 5 p.c. Con. ...	155—160	...	...
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	144—149	...	146—147½
855,000	,,	Mar. 2	7	8	British Ord.	158—163	...	161½
100,000	,,	Dec. 16	7	7	Do. 7 p.c. Pref.	153—158	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	96—101	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	107—112	...	...
200,000	,,	,,	17/6⅔	3½	Do. 3½ p.c. Red. Deb. ...	98—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	Jan. 6	4½	4½	Do. 4½ p.c. Deb. ...	81—86	...	...
626,860	,,	Feb. 3	6	6	Cardiff Con. Ord.	130—135	...	...
237,860	,,	Dec. 16	5	5	Do. 5 p.c. Red. Deb.	110—115	...	...
98,936	1	Apl. 20	2/-	2/-	Colombo, Ltd., Ord.... ...	1⅝—1⅞	...	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref....	20/—22/-	...	...
609,204	1	Mar. 30	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	18 6—20/6	...	...
296,053	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref	22/6—24/6	...	...
1,775,005	Stk.	Feb. 3	5	5	Commercial Ord.	97—102	...	97—98½
620,000	,,	Dec. 2	3	3	Do. 3 p.c. Deb. ...	85—90	...	...
286,314	,,	Feb. 17	5	5	Do. 5 p.c. Deb. ...	120—125	...	124½
807,560	,,	,,	7	7	Croydon sliding scale ...	158—163	...	161½—163
644,590	,,	,,	5	5	Do. max. div.	115—120	+1	118—119¾
620,385	,,	Dec. 16	5	5	Do. 5 p.c. Deb.... ...	121—126	...	...
239,000	,,	Feb. 3	5	5	East Hull Ord. 5 p.c.... ...	107—110	...	108
184,555	,,	Feb. 17	6	6	East Surrey Ord. 5 p.c. ...	130—135	...	...
176,211	,,	Dec. 16	5	5	Do. 5 p.c. Deb. ...	122—127	...	...
19,284,128	,,	Feb. 3	5½	5½	Gas Light & Coke 4 p.c. Ord.	27 9—28 9a	...	28/—28/6
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. ...	90—93	...	91—91⅛
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	105—108	...	106½—108
8,602,497	,,	May 18	3	3	Do. 3 p.c. Con. Deb. ...	87—90*	...	88¾—89¼
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—118*	...	118
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	113—116*	...	115
270,466	,,	Feb. 17	6	6	Harrogate New Cons. ...	130—135	...	...
157,500	1	Mar. 16	1/7½	1/7½	Hongkong & China, Ltd. ...	1⅞—1⅞	...	...
213,200	Stk.	Mar. 2	6	6	Hornsey Con. 3½ p.c. ...	135—140	...	...
5,600,000	,,	May 18	8	12	Imperial Continental Cap. ...	152—157*	—½	150½—158
223,130	,,	Jan. 20	3½	3½	Do. 3½ p.c. Red. Debs.	92—97	...	...
285,242	,,	Feb. 17	8½	8½	Lea Bridge 5 p.c. Ord. ...	175—180	...	177—178
165,736	,,	Mar. 16	8	10	Maidstone 5 p.c. Cap. ...	180—190	...	...
63,480	,,	Dec. 16	3	3	Do. 3 p.c. Deb. ...	80—85	...	84
75,000	,,	May 18	110	110	Malta & Mediterranean	195—205*	...	...
					Metropolitan (of Melbourne)			
392,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb.	102—107	...	...
231,978	Stk.	Feb. 17	5	5	M.S. Utility 'C' Cons.	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	103½
360,075	,,	Dec. 16	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
148,955	,,	,,	5	15	Do. 5 p.c. Deb. ...	123—128	...	...
125,000	—	Jan. 2	3½	3½	Do. 3½ p.c. Rd. Rg. Bds.	99—102	...	...
675,000	Stk.	Nov. 18	†3	13	Montevideo, Ltd.	70—75	+1	...
225,000	,,	Feb. 17	7½	7½	North Middlesex 6 p.c. Con.	169—174	...	172
396,160	,,	Feb. 3	5	5	Northampton 5 p.c. max. ...	108—113	...	...
300,000	,,	Apl. 20	19	17	Oriental, Ltd....	165—170	...	167½
416,617	,,	Dec. 16	8	8	Plymouth & Stonehouse 5 p.c.	166—171	...	...
504,416	,,	Feb. 3	8¼	8¼	Portsmouth & Gosport Cons.	170—175	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	108—113	...	...
73,350	,,	Feb. 17	...	5	Do. 5 p.c. Pref. ...	130—135	...	...
114,000	,,	Feb. 3	5	5	Preston 5 p.c. Pref. ...	110—115	...	...
355,698	1	Apl. 20	1/-	1/-	Severn Val. Gas Cor. Ld. Ord.	20 6—22/6	...	22/3
454,510	1	Mar. 16	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	21/—23/-	...	21/10½—22/3
133,201	Stk.	Feb. 17	8½	5	Shrewsbury 5 p.c. Ord. ...	147—152	...	...
90,000	10	27 May '35	†3	†3½	South African...	4—5	+½	...
1,106,173	1	May 4	1/2½	1/2½	South East'n Gas Cn. Ld. Ord.	26/—28/-	...	26/9
845,511	1	Mar. 16	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	21/—23/-	...	22/1½—22/6
200,000	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	20/9—21/9	...	21/6
450,000	Stk.	Feb. 17	4	4	Do. 4 p.c. Red. Deb. ...	101—104	...	...
6,709,895	,,	Feb. 3	5	6½	South Met. Ord.	123—126	—1	123¾—125½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf....	145—150	...	148—149
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf....	104—107	...	105—106
1,895,445	,,	Dec. 16	3	3	Do. 3 p.c. Deb. ...	88—91	...	88
1,000,000	,,	Jan. 6	5	5	Do. 5 p.c. Red. Deb.	114—117	...	116—116½
1,543,795	,,	Feb. 3	6	6	South Suburban Ord. 5 p.c....	131—136	...	132½
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	122—127	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	103—108	...	...
888,587	,,	Dec. 16	5	5	Do. 5 p.c. Deb....	123—128	...	125
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	104—109	...	...
427,859	1	May 4	9½	1·2½	S. Western Gas & Water Ord.	22 6—23/6	...	22/3—23/-
160,523	1	Apl. 20	...	-/10½	Do. 4½% Red. Cum. Pref.	21/9—22 9	...	...
110,000	Stk.	Dec. 16	4	4	Do. 4½% Red. Deb. ...	100—105	...	...
647,740	,,	Feb. 3	5	5	Southampt'n Ord. 5 p.c. max.	113—118	...	...
121,275	,,	Dec. 16	4	4	Do. 4 p.c. Deb.	98—103	...	...
350,000	,,	Feb. 3	5½	5½	Swansea 5½ p.c. Red. Pref. ...	111—116	...	114—115
106,000	,,	Dec. 16	6½	6½	Do. 6½ p.c. Red. Deb. ...	96—101	...	...
94,000	,,	...	...	...	Do. 3½ p.c. Red. Deb. ...	96—101	...	...
1,076,490	,,	Feb. 17	6¾	6¾	Tottenham and District Ord.	149—154	...	153
409,835	,,	,,	5¾	5¾	Do. 5½ p.c. Pref....	130—135	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	...
371,850	,,	Dec. 2	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
369,774	,,	Feb. 3	7	7	Uxbridge, &c., 5 p.c. ...	153—158	...	157—158½
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	...
1,340,521	,,	Feb. 3	7	7	Wandsworth Consolidated ...	158—163	...	161—162½
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	122—127	...	...
500,000	,,	...	...	...	Do. 4 p.c. Pref. ...	104½—106½	...	105⅝—105⅞
1,317,964	,,	Dec. 16	5	5	Do. 5 p.c. Deb. ...	123—128	...	...
338,300	,,	,,	4	4	Do. 4 p.c. Deb. ...	104—109	...	105⅞
499,735	,,	Feb. 17	6¾	7½	Watford and St. Albans Ord.	155—160	...	159
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	133—138	...	133
200,000	,,	Dec. 2	4	4	Do. 4 p.c. Red. Deb.	100—105	...	...
100,000	,,	,,	...	3½	Do. 3½ p.c. Red. Deb.	100—103	...	...
158,400	,,	Mar. 2	5	6b	Winchester W. & G. 5 p.c. Con.	115—120	...	...

a.—The quotation is per £1 of Stock. b.—Paid £3, including 10s. on account of back dividends. * Ex div.
† Paid free of income-tax. ‡ For year. § Actual for three months.

Stock and Share List continued overleaf.

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by

R. N. LeFevre, M.Inst.Gas E.

Officer-in-Charge of Training, The Gas Light and Coke Company, Assistant Head of Department of Gas Engineering and Supply, Westminster Technical Institute.

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Stocks Officially Quoted on Provincial Exchanges

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. May 29.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	Feb. 3	5	6	Bath Cons.	124—126	...	...
1,667,250	,,	Feb. 17	5	5	Bristol, 5 p.c. max. ...	120—122	...	...
120,420	,,	Dec. 16	4	4	Do. 1st 4 p.c. Deb. ...	103—105	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	103—105	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	126—129	+1	...
274,000	,,	Feb. 17	5	5	Newport (Mon.) 5 p.c. max....	111—116	...	...
13,200	12	Mar. 16	7	8½	Pontyp'l Gas & W. 10 p.c. 'A.'	14—15	...	...
13,600	10	,,	5	6	Do. 7 p.c. B.'	11½—12	...	...
40,000	10	,,	5	6	Do. 7 p.c.' C.'	11½—12	...	...
140,778	Stk.	Feb. 17	5	5	Weston-super-Mare Cons. ...	113—115	...	...
64,338	,,	Dec. 16	4	4	Do. 4 p.c. Deb.	98—100	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	165—169	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Feb. 3	5	6½	Chester 5 p.c. Ord.	109—114	...	...
92,500	,,	Dec. 16	4	4	Do. 4 p.c. Pref.	100—105	...	...
32,540	,,	,,	3½	3½	Do. 3½ p.c. Deb. ...	91—96	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	100—105	...	...
2,167,410	,,	Feb. 17	6	6	Liverpool 5 p.c. Ord. ...	135—137	...	...
245,500	,,	Dec. 16	5	5	Do. 5 p.c. Red. Pref. ...	103—108	...	...
306,083	,,	Jan. 6	4	4	Do. 4 p.c. Deb. ...	105—107	...	...
106,280	,,	Feb. 3	10	10	Preston 'A' 10 p.c. ...	202—212	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	140—150	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Mar. 2	8	8	Blyth 5 p.c. Ord.	154—156	...	...
732,000	,,	Feb. 3	5	5	Hartlepool G. & W. Co. & New	117—119	...	...
2,061,315	,,	Feb. 3	5	5½	Newcastle & Gateshead Con.	26/—26/6a	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	107—108	...	...
776,706	,,	Dec. 16	3½	3½	Do. 3½ p.c. Deb. ...	100½—101½	...	...
277,285	,,	May 4	5	5	Do. 5 p.c. Deb. '43...	103—104	...	...
209,820	,,	Mar. 2	8½	8½	South Shields Con.	169—171	...	...
299,542	,,	Feb. 3	6	6	Sunderland 6 p.c. max. ...	129—131	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Feb. 17	7	10	Derby Con.	176—186	...	...
55,000	,,	Dec. 16	4	4	Do. 4 p.c. Deb.	100—105	...	...
84,750	,,	Feb. 17	5	12	Long Eaton 'A' Ord. ...	175—185	...	...
50,000	,,	,,	4	10	Do. 'B' Ord. ...	130—140	...	...
20,000	10	Dec 16	5	5	Do. 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Feb. 17	10	10	Great Grimsby 'A' Ord. ...	220—230	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	220—230	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—215	...	...
1,806,339	,,	Feb. 17	6	6	Sheffield Cons.	146—149	−1	...
95,000	,,	Dec. 16	4	4	Do. 4 p.c. Deb.... ...	100½—102½	...	...

a The quotation is per £1 of Stock.

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	...	...	...	Ascot Ord.	119—124	...	...
128,182	,,	...	...	...	Do. 5 p.c. Pref.	117—122	...	...
238,631	1	Nov. 4	5	5	Assd. Gas and Water Ord. ...	22/—24/-	...	...
323,681	1	,,	4½	4½	Do. 4½ p.c. Cum. Pref. ...	22/—23/-	...	...
150,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb. ...	...	...	...
17,000	,,	Feb. 17	8	8	Bognor Orig. Ord. 'A' ...	175—185	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	175—185	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	145—150	...	...
37,440	,,	Feb. 3	10	10	Cam.Univ. & Town 10 p.c.max.	210—220	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	158—163	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	108—113	...	...
65,000	,,	Mar. 2	7½	8½	Eastbourne 'A' 5 p.c. ...	160—165	...	...
198,000	,,	,,	6	7	Do. 'B' 3½ p.c.	133—138	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	120—125	...	...
130,000	,,	Dec. 16	5	5	Do. 5 p.c. Deb.	122—127	...	...
250,000	1	Nov. 18	...	4	Gas Consolidation Ord. ...	20 6—22 6	...	...
250,000	1	May 18	4	4	Do. 4 p.c. Red. Cum. Pref.	19/6—20/6*	...	19/4½—20/-
700,000	Stk.	...	...	...	Gas Light & Coke 3½ p.c. Rd. Db	102—104	...	104
24,000	30	Feb. 3	8½	8½	Great Yarmouth 8½ p.c. max.	52—57	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.... ...	42—45	...	...
51,160	Stk.	Dec. 2	5½	5½	Do. 5½ p.c. Deb.... ...	123—128	...	...
152,600	,,	Mar. 2	8	8	Guildford Cons.	185—195	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	114—119	...	...
68,250	,,	Dec. 16	5	5	Do. 5 p.c. Deb.	120—125	...	...
156,600	,,	Feb. 3	7½	7½	Hampton Court Cons. ...	173—178	+3½	175½—177½
81,660	10	Feb. 4,'35	5	9	Leatherhead Ord.	16—17	...	...
107,960	10	Mar. 16	4	5½	Mid Kent Ord.	10—11	...	...
230,940	Stk.	Feb. 17	10	10	Oxford & District Ord. ...	210—220	...	215
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	118—123	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	113—118	...	...
126,193	,,	May 18	7½	7½	Peterborough Ord.	157—167*	...	...
64,990	,,	Mar. 16	7½	7½	Redditch Ord.	113—118	...	...
166,850	,,	Feb. 17	7	9	Romford Ord.	170—180	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 16	5	5	Do. 5 p.c. Deb.	120—125	...	...
10,950	,,	Mar. 2	8	8	Ryde Ord.	165—170	...	...
136,191	,,	Feb. 3	5	7	Scarborough Ord.	128—138	...	...
27,825	,,	Feb. 3	8	8	Shanklin & Ventnor Cons. ...	152—162	...	...
40,643	,,	Mar. 2	7	7	Slough Ord.	147—152	...	...
221,000	,,	Dec. 16	5	5	Do. 5 p.c. Deb.	116—121	...	...
28,872	1	May 4	5½	5½	S. Midland Gas Cpn.Ltd. Ord.	20/—22/-*	...	...
28,866	1	Mar. 16	4½	4½	Do. 4½ p.c. Red. Cum Pref.	19/6—21/6	...	...
137,730	.	Feb. 17	7	7	Southgate & Dist. 7 p.c. max.	148—153	...	154—155
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	115—120	...	...
117,228	,,	Mar. 2	5	6	Swindon Cons.	111—116	...	...
60,425	,,	Dec. 16	5	5	Do. 5 p.c. Deb.	122—127	...	...
50,000	1	Mar. 30	...	5·52d.	a Utd. Kingdom Gas Cpn. Ord.	20/6—22/6	...	21/3—21/7½
760,910	1	,,	2½	2½	Do. 4½ p.c. Prefd. Ord....	20/—22/-	...	21/10½
110,910	1	May 18	2½	4½	Do. 4½ p.c. Cum. Pref. ...	21/—23/-*	...	21/6—21/10½
900,000	Srk.	Mar. 16	...	3½	Do. 3½ p.c. Red. Deb. ...	98—101	...	...
130,000	,,	Feb. 3	5	8	Wakefield Ord.	140—145	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	105—110	...	...
82,000	,,	Feb. 3	6	6	Weymouth Ord.	106—111	...	...
98,384	,,	Feb. 3	6	6	Wolverhampton 6 p.c. Pref.	127—132	...	...
160,000	,,	Dec. 16	5½	5½	Do. 5½ p.c. Rd. Db	107—112	...	...
370,000	,,	Feb. 3	4	6	York Cons.	108—113	...	...
90,000	,,	Dec. 16	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...	...
133,640	,,	Feb. 3	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	130—135	+3	131—134
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	115—120	...	...
35,000	,,	Dec. 16	5½	5½	Do. 5½ p.c. Deb.... ...	130—135	...	...

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